

*** REVISED-- 2nd EDITION ***

CRUISER'S RADIO GUIDE

An Operating Guide For The

Maritime Radio Service

Amateur Radio Service-
Maritime Mobile Operations



"A Sourcebook for Radio Information
--the New Operators' Bible"

By Roger Krautkremer, K0YY

HURRICANE - STORM WARNINGS
17.362 Miami, FLA.

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CRUISER'S RADIO GUIDE
Revision 2, Third Printing

CORRECTIONS:

Appendix 15, paragraph # 5--Selected SITOP WX Broadcasts, page B-24.
Change offset to minus 1700 Hz. Note—information is correct on page 13,
Operating Notes paragraph.

UPDATES:

1. Appendix 2, Addresses, paragraph 2--Maritime Service Providers, page A-13.
Add Sailmail Association, 921 E. Charleston Road, Palo Alto, CA, 94303,
Email: www.sailmail.com. Service: Digital messaging and Email.

2. Part II, Maritime Radio Service, Digital Selective Calling (DSC), page 11.
DSC only monitoring has been delayed on VHF. VHF monitoring of channel 16
by large vessels at sea has been extended to February 1, 2005. See the USCG
web site for details.

3. Appendix 20, HF PACTOR Mailboxes, North America listings. The K4CJX
MBO is no longer in operation. A commercial digital service is anticipated from
the same location.

WDA-9387
KG6 Nky
WDC 5869

Cruiser's Radio Guide

Comments about the Cruiser's Radio Guide:

"Splendid... This book is factual and informative, written by Roger who is a well-respected ham and marine operator... He gives you all the details on how to get on the air, and how to stay squeaky clean with the FCC, too. ...Installation and operation of an HF system will lead to great worldwide communications, if the installation is done properly. With this book, you can do it yourself, or oversee someone getting it done for you... its all detailed right here."

—Gordon West, WB6NOA

(Gordon is well-known in the radio communications industry. He has blue-water sailing under his belt, owns and operates his own radio school, and has written hundreds of communications articles and many manuals. Gordon has helped thousands of new hams get their license.)

"The Cruiser's Radio Guide is the most comprehensive guide of its time. It is written in such a way that it enables the novice mariner to the old salt to find the answer they are looking for in communications operations."

—Wally Wynn WA6ITE,
Flotilla Commander,
Flotilla 15-04,
United States Coast Guard Auxiliary.

(Wally plays a key interface role in rescue communications. He has over 30 years experience as a ham and military radio operator. Wally works closely with the Coast Guard Rescue Coordination Centers and operates a Coast Guard licensed auxiliary coast station.)

DAVE OSBORNE

KG6 Nky

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Note: This guide provides practical, helpful hint ideas for mariners and ham operators. 47 CFR Part 80, Maritime Services, and 47 CFR Part 97, Amateur Radio Service provide legal definitions for licensing and operating requirements. The American Boat Yacht Council (ABYC) and US Coast Guard establish installation standards for vessels. See the standards for definitive guidance.

Caution: Lethal voltages are present in some radio equipment.

Cruiser's Radio Guide

Illustrations by: Gerri Wood.

Drawings by: Lary Wasserman WA2FHI of SV Lorilee.

Editor: Marilyn Krautkremer KB0LJW previously of SV Fantaseas

Acknowledgments: Thanks to the many hams and mariners who over a period of many months have provided input to the Guide or moral support. Special thanks to those hams and mariners who reviewed and commented on the draft, including: Gordon, WB6NOA; Craig, W7TZL and Scottie, AL7JU of Vixon; Jack, VE3EED/W6 of Hayate; Dick, AA6HC of Mandalay; Ed, KD6FYC and Anna Maria, KD6POE of Mariana; Chuck, AH6NR and Gigi, WH6OY of La Mouette; "radio Mike", WB6ERA of Bluebird; Wally, WA6ITE of SV Alana Kai; Lary, WA2FHI of Lorilee, Joost ZS5S, and Nedra, KK5PN and Allen, KC5LT of SV Blythe Spirit. A very special thanks to my wife and editor, Marilyn KB0LJW, for her patience during writing and her editing of the draft.

Roger Krautkremer
K0YY (ex W6SOT), previously of SV Fantaseas
Denver, CO

Also By The Author: K0YY Maritime Mobile Net List.

Dedication:

This guide is dedicated to every boater who dreams of sailing into the sunset in a small boat; especially those who wonder if they will actually make it.



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PART I. INTRODUCTION

READ ME FIRST

If you're new to radio operations, you should understand that the Marine Radio Service and the Amateur Radio Service are separate and distinct. Each service has its own rules, operating procedures, licensing requirements, equipment, and frequency bands. Their differences and similarities are described in the following chapters.

WHY BUY THIS GUIDE?

This guide provides a concise yet comprehensive source for cruisers interested in Maritime Radio and Amateur Radio maritime mobile operations. It is in fact, a very useful sourcebook for all mariners.

Information and suggestions in this book answer many newcomers' questions, assist in making wise equipment choices, save money by preventing improper marine license applications, offer advice on using equipment properly, provide an easy reference source for hard to find information, and ultimately help get the most from an expensive investment. A few of the many questions addressed by this Guide are listed below in the Frequently Asked Questions paragraphs.

PURPOSE

The purposes of the Cruiser's Radio Guide (CRG) are to

1. assist the mariner in making intelligent communications decisions based upon his or her communications needs and cruising grounds.
2. pull together in a single source, the most frequently used radio information needed by cruising mariners and ham operators interested in Maritime Mobile (MM) operations.
3. make the CRG "user friendly", to write in laymen's terms and provide clear explanations wherever possible.

SCOPE

The CRG focuses on the recreational, "voluntarily equipped" mariner. It is written for the new or intermediate level marine or ham radio MM user. The CRG also provides detailed, hard to find information needed by advanced operators. Due to size constraints, the geographic scope for some information is limited to US, Canadian, and Caribbean waters. No attempt is made in the CRG to cover all "standard" information normally found in a license manual or radio handbook.

TERMS

There are many special terms used in marine and ham radio. They are designed to make "old heads" feel important and have newcomers hold them in awe. Only by passing the special "rights of passage" shall a newcomer be allowed to be called an old head. There are secret lists of these terms carefully hidden in the Glossary and the MM Net Special Terms Appendices (#1 & 8).

GUIDE LAYOUT

The CRG is organized to answer basic questions within each topic area. Additional information is referenced if desired. THE CRG is written in five parts:

- The Introduction,
- Maritime Radio Service,
- Amateur Radio Service,
- Common Information, and
- The Appendices.

FREQUENTLY ASKED QUESTIONS(FAQS)

The CRG addresses questions frequently asked during cruiser-oriented radio communications seminars and ham radio license preparation classes specifically oriented for MM operations.

MARITIME SERVICE

Mariners just getting started in radio operations want to know what radio equipment they need and why? The selection process is similar to selecting other marine equipment. It is defined by your

- Style of boating,
- Planned cruising grounds, and of course,
- Pocketbook.

The solution lies in addressing the following:

- Do you cruise with a minimum of electronics or must you have the latest equipment?
- Where are you cruising? Are you lake or river, coastal, or blue water cruising? Do you harbor-hop or make long passages?
- Do you want or need to keep in contact with people "back home", just others in the local area, or no one at all?
- What does your budget support? Can you afford 800 or 3000 dollars?

Don't forget these questions:

- If I'm stranded and need help, how do I get it when I'm hundreds or thousands of miles from home?
- OK, I need HF coverage, should I go Ham or Marine?
- How do I get started?
- What licenses do I need?
- What are the proper operating procedures?
- Where do I find the best weather information?
- What do I need to receive WX FAX? Where are the stations located, and when do they transmit?
- How do I make a High Seas phone call?
- How can I send and receive e-mail messages, faxes, or computer data files while cruising?

Information to help you answer these and many other questions is presented in the Maritime Radio Service Chapter, The Common Information Chapter, and the Appendices.

HAM MARITIME MOBILE (MM) OPERATIONS

Hams breaking into MM operations are often looking for sources of information on many specialized operating practices and modes. Some frequent questions include:

- Where are the MM Nets located, when are they on, what areas do they cover, and what procedures are used?
- How do I insure a good radio installation aboard a vessel?
- What ham gear is best aboard a cruising vessel?
- Can I run HF digital modes from my boat and retrieve my messages while out cruising?
- How do I find the location of HF Gateway Stations to send internet email and gateway to the packet network?
- When do I need a Reciprocal License?
- What countries can I run Third Party Traffic with?
- What license do I need and what frequencies do I use when I am in international waters?

These and other questions are answered in the Amateur Radio Service Chapter, the Common Information Chapter, and the Appendices.

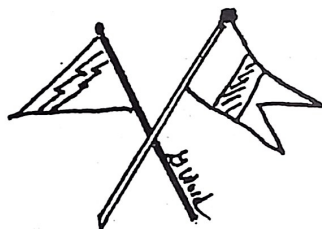
GETTING STARTED

A word of encouragement before we get into some of the details and technical stuff. "It ain't all magic and done with mirrors." You can learn what you need to know for effective radio operation while cruising.

Take it a little at a time. Start with the information you must have immediately--perhaps licensing requirements, services available, equipment selection, or basic operating practices. Like any detailed subject, it takes some time. I hope you learn to enjoy it as much as I do. Advice: Don't put it off until the very last. Fair winds, and see you on the air!

COMMENTS AND CORRECTIONS

Some information, like frequency and schedule information, is outdated nearly as soon as it is printed. Comments on currency, content, or better ways to present information are always appreciated. If an error creeps into the Guide, your correction will be greatly appreciated. See the Comment/ Correction Form included in Appendix 3. Thanks for your interest!

**PART II. MARITIME RADIO SERVICE-
RECREATIONAL VESSELS****REGULATIONS**

The Maritime Radio Service is regulated by Part 13 and Part 80 of the Code of Federal Regulations (47 CFR Part 13 and Part 80 are the full references), the Communications Act of 1934, and the Telecommunications Act of 1996. Recreational boaters operating transmitting equipment on marine frequencies must comply with Part 13 and Part 80 requirements.

Recreational "pleasure craft" vessels under 20 meters in length are governed under rules pertaining to "voluntarily" equipped vessels. Commercial vessels carrying passengers or cargo for hire, commercial fishing boats, etc. operate under similar but separate rules. Required radio equipment is spelled out in great detail for commercial, "compulsory" equipped vessels.

Voluntarily equipped recreational vessels are not required to carry marine radio equipment. If they do however, they must be licensed and operated according to the Part 13 and 80 rules.

LICENSES

There are two types of radio licenses for recreational boating. The first is used for licensing equipment and is called the Station License. The second is for licensing operators and is called the Restricted Radio Telephone Operator Permit (RRTOP).

SPECIAL NOTE: The Telecommunications Act of 1996 brought major changes in the licensing requirements for recreational vessels.

The Telecommunications Act of 1996, implemented by FCC Order 96-421, Oct 1996 deleted the requirement for recreational "voluntary licensed" (non commercial) vessels to obtain a ship station license if:

1. You are only involved in domestic (non international) travel, and
2. you are not involved in international or long distance communications, such as HF SSB, satellite communications, or talking with foreign coast stations. E.G. Canada, Bermuda, Bahamas, Mexico, etc., and
3. You are not a "compulsory licensed" vessel. E.G. passenger vessel for hire, commercial vessel, vessel over 20 meters in length, etc. Reference--FCC WTCB Fact Sheet # 14.

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If you are involved in international travel or communications (VHF, HF or satellite), you still must obtain both a Ship Station License and a Restricted Radio Telephone Operator Permit (RRTOP) described below.

The US Coast Guard no longer checks for valid FCC licenses during their safety (boarding) inspections.

MARINE SHIP STATION LICENSE

If you fall within the requirements listed above, a station license is required for all marine band transmitting equipment installed on board your recreational vessel. This includes a VHF radio, any HF or MF SSB radio, EPIRB, and Radar. Anything that transmits a signal must be included on your station license. All frequencies and modes you intend to use must also be identified, including DSC, SITOR, CW, Voice, etc. See the instructions included with the license application.

Applications for station licenses are filed on FCC Form 506. Use the July 94 or newer version of the form. Renewal applications may be submitted on FCC Form 405-B or alternately, Form 506. The forms may be obtained from the FCC Licensing Division, FCC Forms Distribution Center, local FCC Field Offices, and some marine stores. See the Address Appendix for addresses.

The station license costs \$75 and is good for ten years. Modifications to or renewal of your station license requires resubmission to the FCC and (other than address changes) payment of a \$45 renewal fee.

Plan your original and renewal submissions wisely. That is, include all possible transmitters, frequencies, and modes you may need (Radar, EPIRB, 406 MHz EPIRB, VHF/ MF/ HF bands, SITOR, DSC, SATCOMM, etc.). If you plan to add equipment in the future, mark it on the application now (and save a \$45 update fee).

Specifically on Form 506, note:

- Item 2-5- You must provide a US mailing address
- Item 6- Current call sign (if using the form for renewing)
- Item 7- Use Fee Code: PASR
- Item 10- Regular (unless portable)
- Item 11- Individual
- Item 12 Owner/ Operator
- Item 15- State registration or Coast Guard documentation number

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- Item 16- PL, YAT
- Item 17- Your boat name
- Item 20- Request an MMSI number. It is used for Digital Selective Calling (DSC) and sometimes NBDP. **Get one even if you don't use it yet.**
- Item 22- Only transmitting equipment should be marked here, and then only that used in the Maritime Service (not Ham, public service, etc.).
- Box V- for your VHF
- Box A- for your coastal EPIRBS. (Show total # if more than 1.)
- Mark both boxes T & U. Most SSBs today do in fact cover both MF and HF.
- Box R- Most small boat radars operate in these ranges.
- Box N- If you will use SITOR/ other digital NBDP modes
- Box F if you will transmit fax.
- Box S- If you will use satellite communications. (Give manufacturer And Type Acceptance number. Provide copy of any INMARSAT documentation.) See item 26 also.
- Box C- If you have the newer 406 MHz EPIRB. (Show total #).
- Item 23- Mark block E if your vessel is over 20 meters in length. Note: special radio equipment is "compulsory" for vessels over 20 meters in length.
- Item 26- Mark "Request ID" in the SELCAL space for SITOR/ NBDP (if you marked box 22N above). Mark the space for INMARSAT # "Request ID", if you will use INMARSAT service.

Remember to sign and date your application. Listing your telephone number may assist in resolving a question the FCC may have without sending the form back.

Note: Got a fax machine? Form 506 is available from the FCC via fax-on-demand. See the Address Appendix.

Handheld VHF transceivers pose a unique licensing challenge. If you just use a handheld to talk with your vessel from a dingy or tender, a separate license is not required. In this case it may be operated under the "Associated Ship Unit" (ASU) provision of the regulations. The main vessel license covers the ASU which is identified normally with the addition of a "Unit number". E.G. Fantaseas, Unit 1 WAQ-2703.

If you carry your Handheld VHF with you from ship to ship, you should license it under the "Portable Transmitter" provision of the regulations. In this case a separate application (and \$75 fee) is required. Item 6P on form 506 must be

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marked and a statement included confirming portable operation. See the instructions for item 6P and Telecommunications Act of 1996 note above.

Special note-- According to Part 80, handheld or ship radio transceivers are not authorized for use on shore. No "mobile" operation (from a car) is authorized. Only properly licensed private or public coast stations and auxiliary stations may legally operate from land. (Government stations are exempted from Part 80 requirements).

Station Licenses cannot be transferred from boat to boat. A new station license must be obtained and the old one turned in or destroyed when you sell your vessel or buy a new one.

RESTRICTED RADIO TELEPHONE OPERATOR PERMIT (RRTOP)

The second type of license is the operator permit. It is required for anyone operating HF or satellite equipment and for all international operations (VHF or HF). This RRTOP is the same one that used to be required for pilots and some other radio users, such as the Civil Air Patrol, etc. You may already have one.

Applications for the operator permit (RRTOP) are filed on FCC Form 753. Use the August 94 or newer versions of the form. The forms are obtained the same as the 506s above. The 753 is, however, sent to a different FCC address for processing. See the Address Appendix (#2). The form 753 is also available via fax-on-demand from the FCC.

The RROTP costs \$35 but is issued for the lifetime of the holder. Additional details on the RROTP license can be found in 47 CFR Part 13 and the Maritime Radio User's Handbook, published by the Radio Technical Committee For Maritime Services (RTCM). See the Address Appendix (#2).

EQUIPMENT

There are two main types of marine radio voice transmitting equipment used on board recreational boats. They are VHF FM and HF SSB transceivers. In addition, some HF equipment is designed to work with digital modems which provide text message and (if provided by a servicing coast station) email service into the internet. All radio transmitters used in the Marine Radio Service must be FCC "Type-Accepted". This is an approval process to ensure that equipment is constructed using quality materials and will operate properly. All type-accepted equipment is marked with a Type Acceptance sticker listing its "Type Acceptance Number".) See the Equipment Selection Paragraph in the Common Information Chapter for details on marine equipment selection.

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VERY HIGH FREQUENCY (VHF) TRANSCEIVERS

VHF transceivers operate in the 156/157 MHz range and provide short range, line of sight communications. They use frequency modulation (FM) which provides exceptionally clear voice communications. Their maximum range, boat to boat, is around 25 miles. Range to a shore station may be as high as 50-75 miles if the shore station uses a high gain antenna system or their antenna is installed at a high location.

Greater distances of several hundred miles are occasionally obtained through atmospheric ducting. This "ducting" is generally hard to predict and short lived.

HIGH FREQUENCY (HF) TRANSCEIVERS

Medium Frequency (MF) and High Frequency (HF) radios provide longer range and additional services. MF radios operate in the 2-3 MHz range and have a daytime range of approximately 75 to 150 miles. HF SSB radios operate from 4 to 26 MHz. They have a range of from several hundred to several thousand miles depending on frequency band, time of day, time of year, and propagation conditions (see the Propagation paragraph in the Common Information Section). It is possible to buy just a MF radio, however, most popular radios today include both MF and HF bands. Marine MF and HF transceivers normally use the Single Sideband (SSB) mode of voice transmission. Ship stations use the Upper Sideband (USB), suppressed carrier (J3E) mode of transmission. See the Emissions and Mode Appendix (#6) for additional details.

Note: HF Digital mode usage requires additional equipment features and stringent adherence to specifications to ensure proper operation. See the Advanced Services, HF Operations, and Marine HF Equipment Selection Paragraphs below for details.

SPECIALIZED EQUIPMENT

Special purpose transmitters, receivers, demodulators (modems), and printers are used to provide special services. Telex Over Radio (TOR), Simplex Telex Over Radio (SITOR), NAVTEX, Weather Facsimile (WX FAX), Digital Selective Calling (DSC or SELCAL) and satellite terminal Ship Earth Station (SES) equipment all provide their own unique services. Additional details are provided in the Services, Operations, and Equipment Selection Sections below. Specific equipment details are available from FMS Consulting Services (the publisher of this book) or qualified marine dealers.

CELLULAR TELEPHONES (CELL PHONES)

Cell phones can add convenient communications capability along coastal and inland areas. Boaters may want to consider them as an easy way to communicate back home. Service availability is limited in some areas. It is possible to place an

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emergency call to the Coast Guard, Sheriff's Patrol, or Harbor Police via cell phone telephone circuits.

Note: In an emergency, cell phone transmissions can not be easily traced by Coast Guard VHF radio direction finding equipment (as with marine VHF transmissions). Therefore relying on a cell phone for your primary boat communications is not advisable.

Using a cell phone with an internet service provider that has 800 # access, can provide effective text message/ email service along major coast-lines or island areas with cell phone service. Air time and 800 # access charges need to be considered for such service. Proper upload and download of previously prepared messages can take less air time (cost less) than interactive voice communications. See the Advanced Services paragraphs below for alternative text message options.

SERVICES AVAILABLE TO MARITIME USERS

NORMAL SERVICES

VHF RADIO

Several useful services are available via the marine VHF radio. You may contact the Coast Guard, place a telephone call, listen to the latest weather forecast, receive personal calls via DSC without having to monitor all calls on a channel, talk ship to shore to private or public coast stations or ship to ship on the recreational vessel working channels. Emergency Position Indicator Radio Beacons (EPIRBs), notify emergency agencies of distress aboard your vessel (on aircraft VHF/ UHF emergency channels not marine VHF). See also The Operations Sections below.

HF RADIO

The services available on MF and HF marine radio equipment include: High Seas Telephone Service, US Coast Guard contact frequencies, ship to shore and ship to ship working channels in several bands (for different distances), Coast Guard and High Seas weather broadcasts, digital data services by private and public coast stations(text messages/ email/ fax, etc.), and international calling and distress frequencies (2182, 4125 kHz, etc.). For radios with general coverage receiving capabilities, short-wave stations with news and music broadcasts or international time signals are also available. See the Operations Sections below and the HF Frequency (#12), Short-wave Broadcast (#14), and Time Signal (#13) Appendices for additional details.

ADVANCED SERVICES

Several special services are available on marine HF frequencies if you have the proper equipment. Although some advanced services are not frequently used by

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all cruisers, the information presented here should define the terms and alert cruisers to capabilities that are available. **Note:** FMS Services offers consulting on these advanced services. See the Address appendix (# 2) for how to contact FMS (the publisher of this book).

DIGITAL SELECTIVE CALLING (DSC)

DSC is a service providing automated calling and receiving capabilities. Stations using this service have unique digital IDs and may call or receive calls from other ship or shore stations without having to listen to all traffic on a channel. Their radio responds to its own digital code to "open the squelch" and notify the user that someone is calling with traffic. Courtesy is still in order; DSC stations should not transmit calls over the top of other traffic in progress.

Pre-formatted messages can be installed (for transmission) in newer DSC capable radios including such messages as: Emergency calls, all ships calls, weather observations, distress location messages (with input from a GPS receiver), specific station call, and several others.

This DSC capability is available on specified frequencies in both the VHF and HF bands. Commercial VHF DSC messaging service is not available in all areas.

Special Note: Large commercial vessels over 300 tons (ships subject to the Safety of Life at Sea Convention {SOLAS}), will only be required to maintain a listening watch on DSC channels (VHF channel 70, and HF 2187.5 kHz the DSC calling channels), after February 1, 1999 (current target date). This rule applies whenever the large vessel is in international waters ("outside the service area of a VHF maritime shore station"). After that time, Recreational vessels may need a DSC transmit capable radio to attract the attention of large commercial vessels when in international waters. (The large vessels will no longer be required to maintain a listening watch on VHF channel 16 or HF 2182 kHz when in international waters).

Recreational boaters shopping for new equipment may want to consider a DSC Class D capable radio for VHF service or a DSC Class E capable radio for HF service. See the HF and VHF Frequency Appendices (#11 & 12) for DSC frequency details.

Note: In order to use DSC services, recreational boaters must request a special Maritime Mobile Service Identity (MMSI) ID on a license application to the FCC. See licensing procedures in the Ship Station License Paragraph above.

WEATHER FACSIMILE (WX FAX)

WX FAX is a very useful service for cruisers. This is especially true if you are out of range of VHF WX broadcast stations. WX FAX provides weather maps, sea state charts, and satellite cloud pictures. There are many transmitting stations located throughout the world. See the WX FAX Frequency Appendices (16A) for North American frequencies and (16B) for World-Wide frequencies.

WX FAX equipment comes in several forms. A high quality HF SSB general coverage receiver is required to receive the signal. A demodulator is required to transform the signal into a usable form. A printer or terminal screen is required to display the output. Special software is also required to process the signal. Several manufacturers make stand alone units or demodulator/ printer units. See a qualified marine electronics dealer for details.

With the many personal computers on board cruising vessels, one of the more popular ways to receive WX FAX is to obtain an external demodulator and feed the signal into a personal computer. Special software is used to process and print chart output. Printing can be to a screen, disk file, or a hard-copy printer. See the WX FAX section in Part IV, Common Information Section and the WX FAX Appendices for additional details. See also the Station Hookup Diagram, Figure 6.

TELEX OVER RADIO (TOR)

TOR refers to an older Radio Teletype (RTTY) mode of transmission used to transmit one or two way text messages from ship to shore or shore to ship. TOR transmissions do not incorporate any error correction techniques. TOR is also called Narrow Band Direct Printing (NBDP) to describe its teletype-to-teletype console/ printer nature.

Automated Telex Over Radio (ATOR) is a newer, fully automated service offered by some coast stations. No operator interaction is required at the coast station. Ship stations may interrogate the coast station to see if any telexes (messages) are waiting and retrieve them automatically.

SIMPLEX TELEX OVER RADIO (SITOR)

SITOR is used by many commercial vessels and is also very useful to recreational vessels. Its use requires special demodulator equipment as well as a high quality HF transceiver. Narrow (CW-500 Hz) filters are highly advisable due to the close spacing of SITOR frequencies.

SITOR transmissions use special error correcting techniques to provide highly reliable text messages, traffic lists, and weather broadcasts. SITOR operates in several modes, including SITOR A or Automatic Repeat Request (ARQ) mode

and SITOR B or Forward Error Correction (FEC) mode. ARQ mode is an interactive mode used between two stations. SITOR equipment operating in ARQ mode requires operator interaction on both ends of the communication. SITOR is often used in the FEC/ broadcast mode where no receiving station feedback is required. SITOR traffic lists and WX broadcasts are transmitted in FEC mode. See the WX Sources paragraphs in the Common Information Section for further details.

SITOR message service is provided by a number of public and private coast stations. Many of the coast stations, as well as several Coast Guard stations, provide detailed **WX broadcasts in SITOR/ FEC mode**. See the WX Frequency Appendix (#15) for frequencies and times. See the Address Appendix (#2) for the phone numbers for Globe Wireless, AT&T, WLO Radio, Message Center Inc., and other public coast stations providing SITOR services.

The US Coast Guard now also maintains a **listening watch** on designated SITOR frequencies, just as they do on voice calling and distress frequencies. See Appendix #12B.

Operating Notes:

1. You will need a SELCAL ID or newer MMSI # in order to use SITOR/ NBDP services. See the Ship Station Licensing Paragraph above for details.
2. Marine SITOR is sent and received in the USB mode with a minus 1700 Hz offset and 170 Hz shift. See Operations below and the appendix for details.

ENHANCED DIGITAL MODES

Some coast stations are now offering improved digital mode service through the use of enhanced software/ hardware schemes. Globe Wireless and Pineoak Digital (see the Address Appendix) both offer internet email interconnect and computer file transfer capabilities (as well as normal text message transfer) via marine radio NBDP channels. Globe Wireless offers world-wide coverage through a network of HF coast stations located around the world. Pineoak Digital provides extensive coverage from its coast station in New Jersey. See the paragraphs on PACTOR and CLOVER in the Amateur Radio Advanced Operations, HF Digital Operations Section for additional technical details. See also the Equipment Selection Paragraphs in the Common Information Chapter for special features required to run these digital modes.

NAVTEX SYSTEM

A variation of SITOR is a one-way broadcast mode called NAVTEX. The NAVTEX System is a world-wide (planned) advisory system. This system provides marine advisory warnings, maritime navigational warnings, offshore weather warnings, and Gulf Stream location information. All pertinent

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information is printed on a hard copy printer for later review by ship personnel. NAVTEX messages carry an address and serial number so that ships only receive desired messages (for a given area or message type- E.G. Navigation Hazard Warnings). Ships personnel may specify which type(s) of messages to receive to limit "repeats" on future transmissions. NAVTEX uses SITOR/ FEC protocol and will also print on SITOR mode B/ FEC systems that are capable of receiving NAVTEX frequencies. See the HF Frequency Appendix (#12) for NAVTEX frequencies.

Some of the more sophisticated (multi-mode) amateur radio Terminal Node Controllers (TNCs) used for Packet, AMTOR (similar to SITOR), or PACTOR also demodulate SITOR and NAVTEX. Some cruising hams are very pleased with the additional WX broadcasts they receive via SITOR, CW, and NAVTEX. See the Amateur Radio Section for further details on AMTOR/ Packet/ PACTOR.

MESSAGE TRANSFER SERVICES.

Some new services are being offered by private and public coast stations in limited areas around the world. These stations provide message transfer services similar to a telephone answering service or internet email mailbox service. Depending on the service provider, message transfer may be automated text messages via SITOR described above, or manual messages via voice. The voice method is provided over normal marine voice channels to the vessel and then either manually transcribed into the internet or passed by voice to a designated land-based phone number. Message Center Inc. provides this service from Pensacola, FL. See the Address Appendix for the addresses of public/ private coast stations providing these services.

SATELLITE SERVICES

Service Interconnection. Several service providers now offer satellite services to maritime customers. Generally, satellite service is available for most parts of the globe, 24 hour a day, 7 days a week. Voice, data, video, and facsimile services are available to maritime stations. Several levels of service are available using different service packages in different price ranges. Special package services are available to provide: news summaries, personalized weather forecasts, stock exchange quotes, sports summaries, etc. A number of providers offer capabilities which are coming into the price range of some recreational boaters. Satellite air time is approximately \$1.50 a minute. (Just four years ago it was \$5.00 a minute).

Ship Earth Station (SES) Equipment is now being offered by a number of manufacturers. Different equipment packages can be acquired to match the levels of service offered above. This equipment is smaller and starts in the price range

of \$5,000. (four years ago it was \$15,000). SES equipment will generally fit on boats 35 feet and larger. FMS Services offers consulting services on the various satellite/ digital services and equipment packages.

OPERATIONS



NORMAL OPERATIONS

FCC operating rules apply to all marine frequencies, VHF and HF alike. These rules include:

- Transmissions should be short and business like. Don't tie up busy channels with idle conversation. This is especially important in congested areas or on busy channels.
- Use courtesy; don't transmit over the top of in-progress communications. Wait your turn.
- Know and use the proper channels. Use only your proper working channels. See the HF and VHF Frequency Lists in the Appendices (#11 & 12).
- Don't talk on the calling and distress channels. Make your initial call and move to a working channel.
- Know and use the proper Procedure Words (proword) when conditions warrant. They help relay meaning in poor reception conditions.

<u>Proword</u>	<u>Meaning</u>
• Affirmative-	Yes, correct.
• Figures-	Specifies "numbers to follow".
• I Spell-	I will use phonetics to spell.
• Negative-	No, not correct.
• Out-	End of transmission, no reply expected.
• Over-	End of transmission, a reply is expected.

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- Roger- I understand.
 - This Is- Used prior to your boat name/callsign.
 - Wait- Standby, A short pause.
- Know and use the Phonetic Alphabet during poor reception conditions. E.G. WAQ 2703 = Whiskey Alpha Quebec (spoken KAY BECK) 2703. See the Phonetic Alphabet Appendix (#7).
 - CB lingo, 10-codes, and ham "Q" signals are not appropriate for marine radio usage.
 - You must identify with your FCC call sign (if required to have a license, otherwise just your boat name) at the beginning and end of a complete transmission (not every "over").
 - There are severe penalties for breaking the FCC rules, and transmitting false or obscene signals.
 - False distress signals will incur especially strong wrath from officials and boaters alike (to say nothing of a very hefty fine, loss of any FCC licenses, a bill for search costs incurred, and possibly some free "hotel" time). A legitimate emergency response may be delayed while officials are off chasing a false "prank".

PROPER MARINE RADIO CALL AND EXCHANGE (EXAMPLE).

The proper way to make a call on a marine calling channel, either HF or VHF is

- Prior to keying the microphone, think through what you want to say, what working channel you'll go to when you make contact, and have available any information you'll need for your radio contact.
- Select the proper calling channel (VHF channel 16; HF 2182, 4125, or 6215 kHz)
- Check the channel to make sure it is clear. Remember, on HF, you may only hear one side of a conversation due to propagation effects. Listen for a little extra time prior to making your call.

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- Key the push-to-talk switch and say your called station's "boat name" three times in a row, then your boat name and FCC "call-sign" (if assigned), then say "over" to indicate the other boat should "go ahead". (multiple repeating of boat names is not necessary when conditions are good or you know your station is listening.)
- If no response, wait 30 seconds and try again. If still no response, wait one minute before retrying. This allows other traffic on the channel to proceed.
- When your called boat responds, advise him or her which working channel to switch to (see below).
- Listen to make sure the working channel is clear, and then call the boat by name and give your boat name and FCC call sign (if assigned).
- Pass your traffic. Do not tie up busy marine channels with chit-chat. Keep your transmissions short and business like. Use the proword "over" to indicate the other boat should transmit.
- When your contact is complete, sign off with your boat name and FCC call sign (if assigned). Finish with the proword "out" to indicate that this is your final transmission.
- Switch back to the calling channel to monitor for calls, safety advisories, or emergency traffic.

VHF OPERATIONS

OVERVIEW

What channels you use on VHF are determined, to a degree, by how you are licensed. Recreational vessels and commercial vessels each have their own set of working channels. Port Operation agencies have their own set of channels. Large vessels approaching certain ports use Vessel Traffic System (VTS) or Bridge-to-Bridge channels. Government agencies have a dedicated set of channels. Some channels are shared by all users. See the VHF Frequency List in the Appendices (#11) for additional details.

OPERATING TIPS

- Recreational vessels underway must monitor **Channel 16**, the distress and calling channel. A secondary calling channel, channel 9, has recently been designated for recreational vessels. It is primarily used in very congested areas. If you have a dual-watch or scanning radio you

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may want to switch to a working channel to talk with other vessels in your cruising group. You should however, still monitor 16 to listen for possible distress calls.

- Recreational vessels talk ship-to-ship or ship-to-shore on the designated **recreational vessel working channels**: 9, 68, 69, 71, 72, and 78. (72 is ship-to-ship only).
- WX information is available on WX1 - WX9. Most US NOAA stations are on WX1 and WX2. See the VHF Frequency Appendix (#11).
- Telephone calls may be placed through the Marine Operator on channels 24 - 28 and 84 - 87. A Marine Identification Number (MIN) is normally used to obtain service. However credit cards and billing to a third number may also be acceptable. Marine operator channels are half-duplex channels. That is, vessels transmit on one frequency and the public coast station (operator) transmits on another. Contact you local telephone office or the Marine Operator for service details.
- Use low power wherever possible. This allows shared use of the channel by stations more than a few miles away.
- Channel 70 is no longer a Recreational Vessel working channel. It is for DSC use only.
- Radio checks should not be directed to the Coast Guard or conducted on VHF channel 16. (Use other boats and working channels to check your radio. Listen to a NOAA WX channel to check your receiver).
- All stations monitor channel 16 for emergency distress calls. (You could be the next one to need assistance.)

HF OPERATIONS

OVERVIEW

You must be specifically licensed to operate on HF marine frequencies. According to Part 80 recreational vessels underway with HF installed should **monitor the Distress and Calling Channel**-- 2182 kHz. 4125 kHz and 6215 kHz are now also used as calling, distress, and safety channels. The US Coast Guard does not maintain a listening watch on 4125 or 6215 kHz.

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Marine Safety Information (MSI) broadcasts concerning weather warnings or navigational hazards are transmitted on designated MF/ HF MSI broadcast frequencies (2670 kHz, etc.) by the Coast Guard. MSI voice broadcasts are normally announced on 2182 kHz just prior to transmission. See the HF Frequency Appendix (#12B) for MSI broadcast frequencies.

Coastal and offshore **WX broadcasts** are given by Coast Guard and some public coast stations on specified frequencies and at specified times. See the WX Frequency Appendix (#15).

High Seas Telephone Service is available on Public Coast Station Channels. Pre-registration with prior arrangements for billing is normally required. High seas, public coast channels are normally half-duplex channels. That is, ship stations transmit on one frequency and shore stations on another. A casual listener tuning on the channel may only hear the shore station side of the conversation. See the Address Appendix (#2) and The HF Frequency Appendix (#12).

There are no separate recreational vessel voice **working channels** on HF. The working channels are shared by all users. Recreational vessels may operate ship-to-ship or ship-to-shore on designated working channels in the 2, 4, 6, 8, 12, 16, 22, and 26 MHz bands. See the HF Frequency Appendix (#12).

Text message, internet email interconnect, and computer file and graphics transfer services are available through the use of SITOR/ NBDP/ Enhanced Digital modes. Operation is accomplished on separate SITOR/ NBDP channels in several bands which provide world-wide coverage. See the paragraphs above in the Advanced Services section for service details. Specific operating details are outlined by the providing coast station. See the Address Appendix for addresses of service providers. See the HF Frequency Appendix for SITOR/ NBDP channels.

HF OPERATING TIPS

- Do not use MF or HF when you can make contact on VHF.
- Do not converse on the calling, distress, and safety channels. Make your call and move to an appropriate working channel.
- Select an HF working channel based upon where you want to call (how far away your desired station is), what stations/ areas you can hear on a band, and what time of day it is. See HF Propagation Tips in the Common Information Section for additional details.

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- Listen to ensure that a channel isn't busy prior to making your call. On HF you may only hear one side of a conversation based upon propagation effects. Listen for a little while prior to transmitting. This applies to digital channels as well as voice channels.
- Keep your transmissions short and business like. Don't tie up busy channels with chit-chat that may be heard over hundreds of miles.
- Identify your station with your boat name and FCC call sign at the beginning and end of your transmission.
- You must have both a Station License And a RRTOP to operate on HF. See the Licensing paragraph above.
- You will need a SELCAL ID for SITOP/ NBDP operations and a MMSI ID for DSC operations.(That's how coast stations identify you.) See the Advanced Services and Licensing paragraphs above for details.
- Major public coast stations with large receiving antenna arrays and high power transmitters may provide extended range as compared to boat-to-boat or small coast station performance. They may provide communications service where smaller stations can't in poor signal propagation conditions.
- Marine HF digital mode operating instructions are provided by the coast station you choose to provide service. See also the HF Digital Mode Operating Tips in the Amateur Chapter. Note: There are similarities, but also differences between Ham and Marine digital operations. See your coast station operations guide for marine operations specifics. Advice: Digital mode operation can take some time to learn. Practice before you go.

EMERGENCY OPERATIONS



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When you need to make an emergency communication, select VHF Channel 16 or HF 2182 kHz, 4125 kHz, 6215 kHz or another "Safety" channel) and make your call. See below for emergency categories.

After making contact with the Coast Guard, they may ask you to switch to channel 22A on VHF, 2670 kHz on MF, or a designated HF channel.

In a true emergency (defined as: "grave and imminent danger to life or property"), you are legally authorized to use any means at your disposal to seek aid. If you are unable to make contact via normal marine radio channels, (and your radio is capable of transmitting on the ham bands) you are entirely legal to seek aid from one of the amateur radio MM nets or any ham operator. See MM Net Operations in the Amateur Radio chapter and the MM Net List Appendix (#18). With hams listening all over the world, you may have a better chance of being heard. MM Net Control stations will handle true emergency traffic from non-ham cruisers.

High power, large receiving antenna array coast stations (SSB or digital) may also provide extended emergency communication coverage.

DISTRESS SIGNAL

When you have an emergency threatening life or property, and there is "grave and imminent" danger, you should transmit the emergency Distress Signal. The International Emergency Distress Signal is:

Voice: MAYDAY, MAYDAY, MAYDAY, followed by the emergency message.

Morse Code: SOS, SOS, SOS, followed by the message.

The Emergency Distress Message should consist of the following:

Boat Name _____, Boat Name _____,
Boat Name _____, FCC Call Sign _____

1. Location (landmarks, bearings) _____

Lat. _____ Long. _____

2. Nature Of Distress (sinking, injured, on fire, etc.) _____

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3. Number Persons On Board/ Their Condition
4. Condition Of Boat Assistance Required
5. Boat Description: Reg. # _____, Length _____
Hull Type/ color _____
Distinguishing characteristics. _____
6. Channel/ frequency you'll monitor _____
This is: boat Name _____, Call Sign _____

If there is no answer, switch to another channel and try again.

See also the Emergency Communications form in the Appendix (#4 copy 2), which should be posted by your radio.

You should be prepared to provide the Coast Guard or other emergency response agency with the following additional information:

Full Description Of Vessel _____

Survival Gear On Board _____

Electronic Equipment On Board _____

Vessel Owner/ Operator Names _____

URGENCY SIGNAL

The International Urgency Signal is used to identify a very urgent message concerning the safety of a ship or person. The signal is:

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Voice: PAN-PAN, PAN-PAN, PAN-PAN, followed by the urgent message. (Spoken as "Pahn-Pahn").

Morse Code: XXX, XXX, XXX, followed by the message.

SAFETY SIGNAL

The International Safety Signal is used to indicate a message concerning the Safety Of Navigation or an important WX Warning. The signal is:

Voice: SECURITE, SECURITE, SECURITE, followed by the message. (Spoken as "Say-Cure-I-Tay").

Morse Code: TTT, TTT, TTT, followed by the message.

RADIOTELEPHONE ALARM SIGNAL

The Radiotelephone Alarm Signal consists of two audio frequency tones, alternating high-low, high-low, similar to European sirens or those used on some US ambulances. The purpose of the alarm is to alert listeners and to activate automatic monitoring alarms. The alarm signal is only used with Distress Signals or the Urgency Signal for man overboard situations.

RADIO SILENCE

In an emergency, the Coast Guard or other agency may impose radio silence for all non emergency traffic. This is done to facilitate emergency transmissions. Radio silence is imposed using the pro-word SILENCE. It is said three times in a row and pronounced "SEE LONSS". All routine traffic immediately ceases on that channel until the SILENCE condition is lifted. The SILENCE condition is lifted using the SILENCE FINI pro-word. It is spoken as "SEE LONSS FEE NEE".

RECEIVING EMERGENCY SIGNALS

If you hear an emergency transmission, listen to see if the Coast Guard or other emergency agency is responding to the call. Normally, you should listen, copy any message details, and not transmit unless you can directly and immediately aid the distressed vessel or finally, if no emergency agency responds. Be careful; do not add confusion to a tense situation!

If no emergency agency responds, or if you are close to the vessel and able to offer immediate assistance, answer the distressed vessel. Copy any Distress or Emergency message, and offer any assistance you can. As a minimum, let the distressed vessel know you copied its message and will attempt to relay it to the appropriate emergency agency. Obtain as much information as possible using the Emergency Data Form in Appendix 4.

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Notify the Coast Guard or other emergency agency, e.g. Harbor Police, Sheriff's Patrol, etc. It's a good idea to have emergency numbers posted ahead of time. See The Coast Guard Rescue Coordination Center (RCC) Appendix (#5) for US and International RCC phone numbers. Other emergency numbers are normally in the front of the local phone book.

Maintain a listening watch with the distressed vessel until the situation is resolved or control is taken by an emergency agency. Moral support, clear thinking from someone outside the emergency, and knowing someone is there can play an important part in helping a vessel resolve an emergency at sea.

MEDICAL EMERGENCIES

For medical emergencies aboard vessels, some regional hospitals may accept collect phone calls. Some hospitals are experienced in providing advice and assistance over the radio/ telephone to vessels at sea. Some public coast stations (High Seas Operators) have procedures established to connect medical emergency transmissions to regional hospitals.

Although they are not set up for emergency assistance, the International Medical Advice for Travelers (IAMAT) organization can help find English speaking doctors internationally. See the Address/ Phone Number Appendix (#2).

ADVANTAGES OF MARINE RADIO (VS AMATEUR)

The Marine Radio Service provides several capabilities either not available in or accomplished better than the Amateur Radio Service. They include:

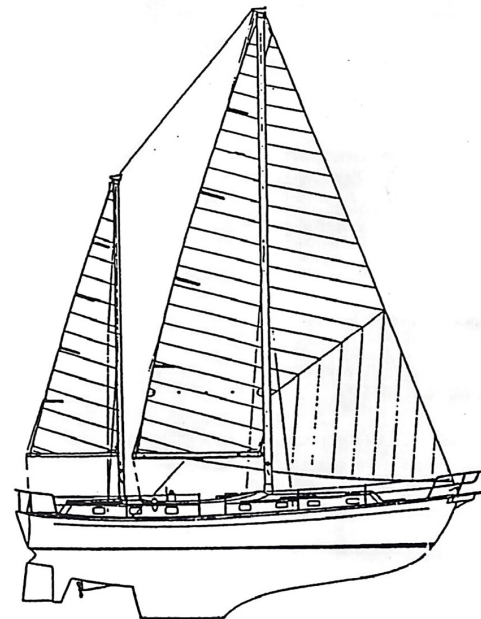
- Commercial Business-- You can conduct all types of business over Marine radio: order parts, request towing service, conduct business back home, etc.
- Public Telephone Service-- You can make phone calls directly through the marine operator on VHF, the high seas operator/ public coast stations on HF, or through satcom links.
- Direct Access To Emergency Response Organizations-- You can call the Coast Guard, harbor patrol, sheriff's patrol, etc. directly on VHF, and Coast Guard on HF.
- Designated Emergency Frequencies-- There are designated VHF and HF frequencies monitored for emergency (distress) communications.
- WX Information-- WX information is directly available via VHF NOAA broadcast stations and on HF via Coast Guard or public coast station broadcasts. (Most newer ham HF transceivers can receive HF WX

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frequencies and most newer VHF ham transceivers can receive NOAA VHF WX channels)

- No Morse Code or Written Tests-- Although not a capability, it is simpler to obtain marine licenses (Fees are charged for marine licenses).
- No marine ship license or RRTOP is required for domestic, VHF only radio operation. (for recreational vessels under 20m in length).
- Text messages, internet email access, and special service packages (personalized weather forecasts, news, sports, stock quotes, etc.) are available via SITOR/ NBDP coast stations. (Service fees are charged).

Additional information on Maritime Operations is contained in the Common Information Section and the Appendices.



PART III. AMATEUR RADIO SERVICE-MM OPERATIONS

Maritime Mobile (MM) operations encompass several aspects of the hobby. Selection of equipment, installations aboard vessels, international operating requirements, reciprocal licensing, third party traffic agreements, MM net operating procedures, and special digital message modes are all part of maritime mobile operations.

REGULATIONS

The basic regulations that govern the US Amateur Radio Service and MM Operations are the Communications Act of 1934, and Part 97 of Title 47 of the Code Of Federal Regulations. Part 97 implements international agreements signed by most nations. These agreements are implemented through the International Telecommunications Union (ITU). The ITU allocates frequencies, defines users by type of service, and specifies which service operates on what frequency band. (E.G. Marine Radio Service, Amateur Radio Service, Broadcast Service, Aeronautical Radio Service, etc.)

Part 97 specifies the purpose of and establishes rules for the Amateur Radio Service. The Amateur Radio Service's purposes are to

- Enhance public awareness of an emergency communications capability,
- Contribute to the advancement of the radio art,
- Advance skills in communications and technical capabilities,
- Provide a pool of trained operators and technicians, and
- Enhance international goodwill.

According to the rules, each amateur station must have a copy of Part 97 available for reference.

Although not regulatory in nature, the ARRL's "Amateur's Code" embodies what an amateur should strive to be. Paraphrased it states, "The amateur is considerate, loyal, helpful, progressive, friendly, balanced and patriotic". See ARRL publications for the full text of the Code.

Self regulation. Amateurs are self regulating by nature. They have worked hard to obtain their license, invested heavily in equipment and time, and don't want to see anarchy take over as in other radio services. Don't be surprised if someone comments when you "push the envelope".

LICENSES

US LICENSING

All amateur radio operators transmitting within the US and US territorial waters, must be licensed by the FCC. All amateurs transmitting aboard US Flag vessels in international waters must be licensed by the FCC and use their US call sign. Foreign amateurs may apply for a US reciprocal license using FCC Form 610-AL.

Applications for an Amateur Radio License are made on FCC Form 610. See the Address Appendix (#2) for FCC addresses to obtain forms. Note: Forms are also available from the FCC fax-on-demand phone system. Forms may also be available from some ham radio dealers and volunteer examiners. There are no license fees for the Amateur Radio License. There are, however, minimal fees for taking an exam.

FCC Form 660, the Amateur Radio License, is both an operator and a station license. The FCC previously required that a fixed station operating location (specific physical location) be specified for a license. However, as of March 1993, a new Form 660 is being used, and a fixed station location is no longer required. Cruisers previously often specified a home address as their fixed station location. As a "live-aboard", it was possible to specify a station location as being aboard a vessel. My license used to say: Yacht Fantaseas, Mooring MC-3, Fiddler's Cove Marina, Coronado, CA.

LICENSE CLASSES

There are six classes of license, each with its own testing requirements and operating privileges. The classes and test elements include: (see notes below)

<u>Op'r Class</u>	<u>Code</u>	<u>Test Elements</u>	<u>Theory # Of Questions</u>
Novice	5 WPM	1A, 2	30 questions
Technician	"No-code"	2 & 3A	55 questions
Technician Plus	5 WPM	2 & 3A	55 questions
General	13 WPM	1B, 3B	25 questions
Advanced	No Added	3C	50 questions
Amateur Extra	20 WPM	1C, 4	40 questions

Note 1: The "No-Code" Technician License candidate must pass both the Novice written and the Technician written elements (2 and 3A respectively). No-Code Technicians may take Morse code Element 1A, 1B, or 1C to become a "Coded-Tech" or "Tech-Plus" and pick up Novice HF privileges. Written tests cover FCC Rules, operating procedures, propagation, radio practices, electrical

principles, circuit components, practical circuits, signals and emissions, antennas, feed lines, and RF Safety. The tests increase in complexity as you go higher in license class.

Note 2: There are proposals underway to create new license classes with reduced Morse code requirements and increased HF band privileges. An "intermediate" class license is one idea, as well as reduced code requirements for the General license. At present these are just in the proposal stage.

Note 3: The current question pool for all licenses, the number of test questions, and the number of correct answers for a passing score will increase with the addition of the new RF Safety area on the tests.

You must pass all previous written Elements leading to the class of license you are upgrading to. For example, to test for the General Class License, you must first show proof of passing the lower level test elements (elements, 2, and 3A). You may do this by providing a copy of a current license or a Certificate Of Successful Completion Of Examination (CSCe) from a Volunteer Examiner (VE) Test Group. CSCEs are valid for 365 days. For code elements, you may start with the lower level element or elect to test directly for the element required for the class of license you're testing for.

The recommended license for a blue water cruiser is the General class (or higher) license. It provides good privileges on the HF bands and allows you access to the voice sub-bands where the MM Nets are located and "phone patches" can be run. The General License is also required to use the HF digital modes. For enthusiasts, the Advanced License offers greatly expanded voice sub-band privileges without having to pass a higher Morse code speed. Advice: Get it before you go if possible. Testing is more readily available in the US.

Study sessions for obtaining a license are available from some high-school adult education classes, community college classes, radio schools (fees charged), ham clubs, and yacht clubs. Check with the local ham radio stores, ham radio clubs, or cruiser-oriented marine stores for locations, times, and details. Study materials are available from a number of organizations and are usually carried at the stores mentioned above. Other good sources are the American Radio Relay League (ARRL) Bookstore, books by the W5YI Group, and the Gordon West Radio School. See the Address Appendix (#2).

VOLUNTEER EXAMINER PROGRAM

In the US, Amateur Radio license exams are now given exclusively by Volunteer Examiners (VEs). As of July 1st, 1993, all Volunteer Examiners must be

associated with an FCC registered Volunteer Examiner Coordinator (VEC) Group.

As of July 1, 1993, testing for all license classes must be given in a scheduled VEC session. (Previously Novice exams could be given by two general class hams, 18 years of age or older. The good news is that General Class VEs are now allowed to give tests for both the Novice and Technician license.) The VE program has dramatically increased the availability of testing compared to previous FCC-only examinations. See the Address Appendix (#2) for the ARRL or W5YI VEC Groups. They both test nation-wide. Numerous other VECs test on a state or regional basis.

There are US VE groups operating in foreign countries, allowing US cruisers to get licensed or upgrade while they're "out there". Availability is usually limited compared to "back home". Some examples include Baja California and New Zealand. Again, check with radio stores, ham clubs, cruiser-oriented marine stores, or MM Nets for information. You can also write or call the ARRL or W5YI VEC Groups for details. See the Address Appendix (#2).

RECIPROCAL LICENSING

US licensed amateurs can obtain a reciprocal license from many foreign governments. The reciprocal license is issued without testing and is based upon your US license (Fees are usually charged). This authorizes operation in that country or its territorial waters. Amateurs must follow the regulations of the reciprocating country. In many cases the regulations are less stringent than in the US. Sometimes full band privileges are available to any licensed amateur. See also Foreign Country Operations below and the Reciprocal License Country Appendix (#9).

Novice/ Tech. Reciprocal Licenses. Some foreign countries allow full reciprocal privileges to US Novice or "Tech Plus" (passed a code test) license holders. In these cases, it is possible for Novice or Tech Plus licensees to operate on HF voice bands that in the US are reserved for General or higher class licensees. These are special cases, but they do provide legitimate HF voice privileges while within foreign waters. When in US or international waters, however, US operators aboard US flag vessels must use their US license and follow the FCC specified sub-band limits for their US license class.

Some countries issue "provisional licenses" to all classes of US Ham licensees including Technician class. Some "no-code Techs" have gotten these provisional licenses. Some US MM nets and US amateurs do not recognize reciprocal privileges obtained with the "no-code" version of the Technician license. (Up-to-date lists of license class are readily available via internet, etc.). The

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international ITU convention (the US and most other countries signed it) does specify showing proof of 5 WPM minimum Morse code capability to operate on HF frequencies below 30 MHz.

EQUIPMENT

Any ham equipment can be installed on a vessel; however, compact equipment capable of operating on 12 volts is desirable. Water resistant, corrosion resistant, sealed units are highly desirable. See the Equipment Selection paragraphs in the Common Information Chapter.

VHF EQUIPMENT

A number of ham cruisers use VHF and UHF equipment as they cruise lakes, rivers, and coastal areas. Repeaters installed on the coast or near cruising areas can provide extended range and autopatch phone service. High level repeaters on mountain tops or high structures can greatly extend VHF coverage compared to simplex ham operation, or station to station operation in the Marine Service. Fifty, seventy five, and even one hundred plus mile coverage is not unusual via a high level repeater. Linked repeater systems may increase range to several hundred miles. This capability provides enhanced communications for Technician Class licensees. VHF coverage outside the US, Canada, and Caribbean is limited.

Some ham VHF transceivers and hand held units have extended receive capability that allows them to monitor marine frequencies. Some of these can be modified so that, in an emergency, they can transmit on marine frequencies as well. (Equipment used on marine frequencies must be "Type-Accepted" for the Marine Service).

HF EQUIPMENT

There are many cruisers using HF ham equipment. They have found that many of the services offered on ham HF are unmatched on the marine bands.

A wide range of HF equipment is used on boats. Some marine HF transceivers are capable of operating on the ham bands. They can do so legally, since "type acceptance" is not required for ham HF transceiver equipment. Marine HF transceivers may however offer only limited capability on the ham bands. Many operate only in discrete frequency steps, not tuning between kHz steps. Also many don't have a "tuning knob", but rely on inputting frequency changes via a keypad. These limitations are usually not acceptable to a ham who frequently uses HF and tunes around to see who's "on the bands". Some marine HF radios may not transmit on LSB, the standard used below 10 MHz on the ham bands. Marine HF transceivers frequently don't have the selectivity filters ham equipment does.

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The most often used HF ham transceivers used by cruisers have a number of features in common. These include:

- Compact, 12 volt operation
- Multi-mode capability--SSB (USB & LSB), CW, AM, FM, RTTY (FSK)
- Good selectivity--narrow crystal filters, variable band pass tuning, IF Shift, notch filters, etc.
- General coverage receiver--to receive shortwave broadcasts, time stations, marine frequencies, etc.
- Numerous memories with split frequency/ duplex capability--to store favorite frequencies, net frequencies
- Accurate frequency readout--to ten Hertz, highly desirable
- Extended transmit capability--for emergency marine usage (Equipment must be type-accepted for marine usage.)
- Digital mode operation--FSK operation, narrow filters available in LSB mode for AMTOR/ PACTOR (AFSK mode), audio in/ out from rear panel

The newer small radios are quite popular. These include: the ICOM 706, Yaesu FT900CAT, Alinco DX70T and Kenwood TS570 radios. The older ICOM 725/ 728/ 735/ 751 series, Kenwood TS 50/140/430/440/450/ series, and YAESU 747/ 757/ 890 series radios are also quite popular with cruisers. The SGC, Kenwood, and Furuno marine SSBs are exceptions to the limitations mentioned above. They have a tuning knob, increment in 100 Hz steps, and can operate on LSB. See also the Equipment Selection Section and the Choosing Between Ham or Marine HF Equipment Paragraph in the Common Information Chapter.

OPERATIONS

The following sections discuss selected ham operations useful to cruisers during maritime mobile operation. The ARRL Operating Guide is an excellent source for routine amateur operating procedures. It is useful to new and experienced hams alike. See the Address Appendix (#2) for the ARRL Bookstore address.

NORMAL OPERATIONS**VHF OPERATIONS****VHF REPEATER OPERATIONS**

Repeater operation is usually similar to face to face communications. That is, it is normal conversation, without the use of "Q" signals, or identifying on every transmission.

Protocol generally suggests that you become a member of or financially support a repeater system you use frequently. For casual use or when traveling out of the area, courtesy use is normally extended to all hams. A few systems are "closed" and only available to members.

In some locations accessible to cruisers, there are repeater systems consisting of several linked repeaters spaced so that their joint coverage area is extended to several hundred miles. Actually there are a number of very complex link systems, but they are "closed" (for members only). Some cruisers find the cost to join these complex systems acceptable if they are staying in one area for a while. Good examples of "open" link systems include:

- The Western Amateur Linking Association along the central California Coast
- The Zia Connection from Southern California to New Mexico
- The Straits Of Georgia Link System in British Columbia, Canada

Maritime nets are also run on some VHF repeaters. The Chesapeake Bay area on the East Coast has a summer MM Net on two meters. The Straits Of Georgia Link System has a MM Net daily during the summer on two meters. The Mount Palomar repeater (146.73 MHz) in San Diego County, CA has a maritime net at 10:00 am local on Sundays.

AUTOPATCH OPERATIONS

Autopatches are a special feature offered on some repeater systems. Many Autopatches are "closed", that is available to members of that repeater only. Sometimes traveling hams are given courtesy access, that is, a local ham will activate the autopatch for you.

An autopatch allows hams to talk on their VHF (or UHF) radios and interconnect to the phone system via the autopatch unit in a repeater. This provides one-way-at-a-time communications. Special "touch-tone" commands bring up and take down the autopatch and dial phone numbers. As with all ham communications, only very limited business type traffic is allowed. Some repeater trustees may designate "no business traffic of any kind" (their licenses are on the line as the trustee). Autopatches are normally for local calls only.

PACKET RADIO BBS'S

VHF Packet Radio opens up long-distance communications to hams without HF privileges or equipment. Packet text messages, similar to internet email may be passed among inter-connected Packet Radio Bulletin Board Stations (BBSs) around the world. After acquiring the proper equipment, you simply find and register with a local BBS which will then give you access to the system. See the Advanced Operations paragraph below for additional details.

HF OPERATIONS

With over 1,000,000 hams around the world, communication capability is truly world-wide. There is a dedicated group of hams who come together to operate the MM nets, keep track of friends, and offer phone-patch service for cruisers. Maritime Mobile Nets and phone patches are perhaps the biggest reasons cruisers consider becoming hams. Their capabilities and services are unmatched in the Marine Service.

HF AND MM OPERATING TIPS

This paragraph contains some operating tips that are "conventions" or "lessons learned". They may not be immediately apparent to a new ham or someone new to MM net operations.

- Ham operations below 10 MHz normally use Lower Sideband (LSB) voice mode. (If you are in USB mode you won't hear a net, even though you're on the correct frequency.)
- Hams aboard vessels sign "Marine Mobile" within territorial waters and "Maritime Mobile Region X" (X = ITU Region 1, 2, 3) when in international waters. See the International Waters Operation paragraph below.

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- Ham mariners operating on HF in a crowded harbor or anchorage, as a matter of courtesy, operate as far away from net operating frequencies as possible. This minimizes interference to other boats trying to monitor the net.
- Ham mariners pick up and pass along messages for other boats (ham and non ham) near them (assuming third party traffic is OK). It's in the best spirit of both the ham radio and cruising communities.
- Do not use a speech processor on a HF transceiver aboard a vessel with its engine running. The processor magnifies the background engine noise, making your transmit audio nearly unintelligible.
- Hams operating in Mexico or Mexican waters under a provisional license are required to give their geographic location when signing their calls.
- US hams operating in Canada or Canadian waters do not need a formal reciprocal license and visa versa. (No paperwork is required.) A full reciprocal agreement has been signed by the respective governments. US hams are limited to the privileges of their stateside license class. Canadian hams are limited to the privileges of a US Amateur Extra class license (or their home license if more stringent).
- Know the sub-band limits for your mode (voice?), class of license (General?), and location (reciprocal license?). This will save you embarrassment and speed your traffic. (Sub-bands change by license class, country, and ITU Region-see Appendix 17 and figure 1).

MM NET OPERATIONS

MM Nets are operated world wide. Cruising hams and shore stations come together on agreed frequencies and times. They come to check in and let others know where they are, provide phone patch or message service, track passage-makers, provide weather information, relay local area information (harbor details, services sources, etc.), or just keep track of their cruising friends. See Appendix #18 for a list of MM nets.

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A cruising ham can find an MM Net to check into from almost any place in the world at several times during the day. Some locations have nearly continuous coverage. Local area nets are run on 80 and 40 meters. Regional and broad area nets are run on 20, 15 and 10 meters.

MM Nets use special protocols to facilitate smooth operation. Nets are controlled operations. Stations transmit only when invited to do so. Stations monitoring a MM net must listen for portions of the net they are interested in.

Net Control Stations (NCSs) or relay stations control net transmissions to facilitate smooth operation. Typical portions of a MM net include some of the following: check-ins with traffic, check-ins without traffic, check-ins from certain geographic areas, passage-maker position reports, and announcements or WX for the net. MM stations with traffic and MM stations underway are usually given priority due to limited battery power and limited operating times underway.

Two special requests, **don't tune on net frequencies**. Nothing drives a NCS or relay station up the wall faster than someone transmitting a carrier right on frequency. Use a dummy load, or tune off to the side at least 3 kHz. Thanks! Second, **zero beat the net control station**. Make sure you're exactly on the NCS's frequency. Don't make him or her chase you all over the dial to hear you.

Several MM net procedures deserve special emphasis. They are listed below.

MM NET CHECK-IN PROCEDURES

Before transmitting on a net, think through what you want to say prior to pushing the transmit button. Don't tie up a net with unnecessary "thinking out loud."

When check-ins are invited for your area or traffic category, check in phonetically with only the suffix of your call (some nets prefer full calls). Do not transmit further until invited to do so. Many MM NCSs will take several check-ins, and then "run" those stations (let them make their calls for traffic). This process is repeated until all formal traffic is handled. Informal "round table" discussions may occur if all formal traffic is handled.

MAKING YOUR CALL ON THE NET.

When the Net Control Station (NCS) or an authorized relay station invites you to complete your call, clearly identify (Full call) who you are, who or what you require, and any limitations you place on someone willing to assist you.

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Examples:

1. You want a phone patch to Denver, CO, you will only take a short-haul, and you are XE2/ KD6XXX in Puerto Escondido, Baja Mexico.
2. You are KD2ZZZ looking for W2XYZ/ MM2 off of Antigua. Has anyone heard him on today or know where he is? Can they call him on marine VHF to get him up on the net?
3. You are KF4YYY/MM2 and are looking for harbor information for Saint Lucia. (E. G. Where is the Port Captain located? What channel does he monitor, and where is the transient anchorage?)
4. You are VK2AAA/ MM3 and need the HF WX FAX frequencies for NMO Honolulu. Does anyone have them available? (You do--in the back--Appendix 16).

You should always have an "off-net" frequency in mind to go to when you hook up with your called station. Also, state who should call, and what you will do if there is QRM (interference). E.G. "I'll call on 7.210, and we'll go down from there."

USE OF PROCEDURE WORDS

Procedure words are simply words or phrases given specific meaning for net operations. This reduces confusion in poor signal conditions and speeds operation by eliminating lengthy explanations. All net users should learn and use these special terms. See the Net Terms Appendix (#8).

PHONE PATCH OPERATIONS

Phone patches allow a ham cruiser to use his or her radio to interconnect into the telephone system and call back home to keep in touch with friends and family. The actual patch equipment is located at a shore-based ham station who hooks his or her radio into the phone line via the patch. The cruiser finds a shore-based ham (frequently on MM Nets) who is willing to run a patch. All communication is over the radio and is by its nature a one-way-at-a-time (simplex) operation. Both the ham on the boat and the party on the telephone should say "over" at the end of each short transmission. This notifies the shore-based ham when to switch from transmit to receive and visa versa. As with all ham communications, only very limited business may be conducted over the air. (No "for personal gain" or "on-going business activity").

Collect call (long-haul) charges may apply if the call from the shore station to your called party is long distance. However, it sure beats standing in line in some

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tiny foreign port, waiting to use the long distance phone (if it is working and you can find one). Many cruisers leave some cash with their families back home to cover any collect charges.

Remember, base stations running patches are volunteering a great service. Don't abuse their good will by asking them to do time consuming tracking down of someone for you, request weird schedules, or ask them to do business related activities. Of course if they're a friend or fellow cruiser, then by all means, abuse them!

INTERNATIONAL OPERATIONS

The ITU has defined three separate world regions, each with its own Amateur Service frequency band, sub-band (voice), and emission limitations. All amateurs operating within these regions must follow the band plan for that region.

The ITU Regions are

Region 1

Europe, Africa, Russia, Middle East, and Mongolia

Region 2

North, Central, and South America

Region 3

Southern Asia and Oceania

See also the ITU Authorized Frequency Appendix (#17).

Figure 1. ITU Regions Map



INTERNATIONAL WATERS OPERATION

US ham cruisers (and others) are authorized to operate in international waters under the authority of their US (home) license. Within Region 2, frequency and emission privileges are the same as within US territorial waters. When operating in other ITU Regions, all hams must also comply with the band limitations for that region. See The ITU Authorized Frequency Appendix (# 7).

Special Note: In Region 1 and 3, and South of 20 degrees north or west of 130 degrees west in Region 2, US hams (General Class and above) are now authorized to transmit voice transmissions in the range 7075 to 7100 kHz. This allows communication with shore based hams of that area.

FOREIGN COUNTRY OPERATIONS

Licensing. Amateurs who wish to operate within foreign countries or their territorial waters, must be licensed by those countries. See Foreign Country (Reciprocal) Licensing in the Licensing Section above and Appendix 9 for details.

In addition, **Third Party Traffic**, phone patches and message traffic, may only be handled from or to those countries with which the US has an established written

agreement. See Appendix 10 for a list. This limitation includes traffic to or from visiting yachts. There is one exception to the "no traffic without a written agreement" rule. Messages may be passed between two hams to a third ham, if all three are properly licensed "and eligible to be control operators" in their current locations. Reference paragraph 97.115 (a) (2).

ADVANCED OPERATIONS-DIGITAL MODES

Several of the more sophisticated amateur operating modes are very compatible with cruising. Many "computer nerd" cruising hams maintain contact with friends via amateur radio bulletin board systems (BBSs), mailboxes (MBOs) and even internet. Sound strange? Not really, they are interconnected via either VHF Packet, HF Packet, AMTOR, PACTOR, GTOR, or CLOVER systems (or a combination). Recent advances in VHF and HF digital modes and interconnect software have brought text messaging and even internet email within the reach of almost every cruiser. See below for details.

ADVICE: If you plan on getting into the "digital modes" learn it before you go. Practice it at home prior to departure. Learning from a distance is difficult for the digital modes. If possible find an "Elmer" (someone to help you) to help you walk through digital operations. This advice courtesy of Nedra KK5PN, a knowledgeable digital operator. Nedra and her husband Allen KC5LT run an HF MBO dedicated to cruisers from San Diego, CA. (Thanks guys!)

Digital mode operation requires a computer, software, radio(s), and a Terminal Node Controller (TNC). See Figure 6 for a typical station hookup diagram.

PACKET RADIO

Packet Radio is a digital mode of transmission. Packet transmissions are short bursts (frames) of data containing addressing, control, error checking, and text message information. Reception and transmission of Packet data requires a special modulator/ demodulator called a Terminal Node Controller (TNC), a PC computer, and a ham radio for transmission of the data over the air.

Packet transmissions can be real time two way conversations, or they can be delayed messages stored in a computer-based bulletin-board system. Computer-based Packet Bulletin Board Systems (BBSs) are available nearly world wide. Many of these BBSs interconnect via either local/ regional VHF/ UHF radio links or via a special internet domain, reserved for the Packet BBS traffic (See AMPR.NET below). These networks provide message transfer service to any packet user within local range of a VHF BBS.

Cruising hams with a Technician Class License or higher can retrieve their messages at will from a local VHF BBS "mailbox" system as long as they are

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registered locally (basically-- provide your name and call to insure you're a properly licensed amateur). Text messages similar to internet email may be sent between packet stations. There is even a "converse mode" on many BBSs, similar to internet "chat sessions" where many people may "talk" at one time.

Amateur Packet Radio Network (AMPR.NET)

The AMPR.NET links together registered Amateur Radio Packet Radio BBS stations. These interconnected BBSs allow the forwarding of message traffic among BBSs when the proper BBS address is known for your desired station. See a Packet Radio manual for further details.

As an example, my Packet address is:

K0YY@N0QCU.#NECO.CO.USA.NOAM.

Format: Notice the format of the address: my call, BBS station call, location information, state, country, and continent.

Besides the nearly world-wide linking of individual packet BBS stations via the AMPR.NET, there are also some BBSs which perform a gateway function between the internet and the packet radio network. These gateways are described below.

Packet to Internet Gateways-AMPR.ORG Stations. Another recent innovation in the packet world is the packet to internet gateway using special inter-connect TCP/IP software. These gateway stations provide VHF packet inter-connection to the internet. Text messages may be passed through these special packet BBSs to and from the internet. Messages from non-ham licensed internet users stop at the BBS mailbox (for the registered ham). The messages can not be passed "real-time" over-the-air, since the internet (non-ham) user is not licensed to do so. The licensed ham must retrieve his or her messages from the BBS.

As an example, my Internet to Packet Address is:

K0YY@GW.N0QCU.AMPR.ORG.

Compare this to my packet address above or my pure internet address of:

rogerk0yy@aol.com.

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For further information see your ham radio dealer and ham radio publications. the ARRL book Personal Computers In The Ham Shack is a good one. Lists of world-wide AMPR.ORG gateway stations are available on many Packet BBS stations.

As with all amateur communications, "no personal gain" may be realized by the amateurs involved and "no on-going business activity" may be conducted via Packet.

HF DIGITAL MODES

Special thanks to Joost ZS5S, and Nedra KK5PN and Allen KC5LT of SV Blythe Spirit, for their input on the HF digital mode information. Visit Nedra and Allen's Web site at: <http://www.geocities.com/TheTropics/Shores/2552/>. Email Joost at ZS5S@iafrica.com. Their MBOs are listed in Appendices 19-21.

There are several HF digital modes that provide unique and powerful communications capabilities for the cruising amateur. A General Class License or higher is required to use these HF digital modes. (They are only allowed in the General Class portion of the bands). The same "business activity limitations" apply as described above in the packet section.

Multi-mode TNCs and special software packages are required to operate the HF digital modes. A simple 1200 baud packet only (VHF) TNC will not do the job. A good reference source for HF digital mode operation is the ARRL book, Your HF Digital Companion.

Several companies make TNCs that are HF digital mode capable and run AMTOR, PACTOR, PACTOR2, Clover, HF Packet, RTTY, etc. Kantronics-KAM Plus; MFJ-MFJ 1278; AEA (out of business but equipment picked up by the Timewave Company)-PK232mbx, DSP232; HAL Co. (Clover), SCS Co. (German-PACTOR/ PACTOR2); etc. Equipment (TNCs) with software can run in the \$375 to 900 range depending on modes supported and features included (Digital Signal Processing {DSP} etc.)

OFF SHORE HF PACKET BBSs.

When you're off shore or out of range of a VHF BBS, an HF Packet BBS may provide additional capability for relaying messages. Both stations involved would have to be within HF range of the BBS being used. Most users find that the other HF digital modes, described below, provide faster throughput and a broader coverage area compared to HF Packet.

AMATEUR TELEPRINTING OVER RADIO (AMTOR)

AMTOR is a digital transmission mode employing error correction techniques. It transfers text-type messages between two or more ham stations. Mail-box and

text message transfer systems are available over HF AMTOR MBOs. Some of the HF MBOs provide a gateway function to and from the nearly world-wide VHF Packet network (AMPR.NET). Some even forward into the internet. See AMTOR Gateways below.

AMTOR transmissions (similar to marine SITOR) can be run in either a broadcast or an interactive mode. The broadcast mode is known as the "B" Mode, or the Forward Error Correction (FEC) Mode. No response is required from a receiving station in FEC/ "B" mode. This mode is used when transmitting information which is of interest to a number of stations. The ARRL Headquarters station, W1AW, transmits broadcasts to all hams in AMTOR Mode B (AMTEX and voice and CW too). HF weather broadcasts in SITOR are also in FEC/ B mode.

The interactive AMTOR mode is known as Mode A, or the Automatic Repeat Request (ARQ) mode. It is used when in contact with a single station and direct error correction feedback is available. The two stations are "connected" for transmission.

Amateur multi-mode TNCs can also receive marine SITOR and NAVTEX, a freebie for hams. See the HF Frequency Appendix (#12) for additional details on receiving SITOR/ NAVTEX.

AMTOR MBO Gateway Stations. Another recent innovation is the advent of HF AMTOR MBO Gateway stations. These stations relay text messages to and from remote locations via a special internet network using special software. The HF MBOs forward to VHF using APLINK or the newer WINLINK (windows) software. The VHF side then forwards to the internet. See Appendix 19 for a list of world wide AMTOR Gateway stations.

Note. AMTOR MBOs are being phased down in many areas in favor of several faster, more powerful modes described below.

PACKTOR

PACKTOR is the most popular amateur HF digital mode. It has higher throughput than AMTOR, better error correction schemes, and allows for the transfer of ASCII and binary information. This allows for the transfer of small computer files as well as graphics files. Large computer files should not be transferred in this manner due to the limited memory capabilities and through-put rates at most gateways.

Special software is required at the both the sending and receiving station to run in conjunction with the TNC. There are several software packages in use by

cruisers including Kantronic's Hostmaster II, MFJ's Multicom, Interflex's KAGOLD (For KAMs)/ PKGOLD (For AEA), and XPWIN, or WINPACK, etc. Typical costs are in the \$50 to 100 range.

PACKTOR MBO Gateway Stations. Similar to AMTOR Gateways but with improved throughput, PACKTOR Gateways not only can relay text messages but also short computer files. Special WINLINK software is used by the MBOs to forward from HF to VHF which in turn gateways to internet. See appendix 20 for a list of world-wide PACKTOR/ PACKTOR-2 Gateway stations.

PACKTOR-2 is yet a newer innovation. It provides faster throughput via improved error-checking capability over PACKTOR but currently remains less used since it requires a special expensive TNC. PACKTOR 2 also has improved weak signal decoding capability.

GTOR

GTOR is used by some cruising hams. It is available in newer Kantronics multi-mode TNCs (KAM Plus) along with AMTOR and PACKTOR. GTOR uses special Golay error correction protocol to provide enhanced through-put rates. GTOR Gateway stations are included in the PACKTOR Gateway station list in appendix 20.

CLOVER

CLOVER is a powerful mode, with higher throughput and better error correction than the other HF modes (except PACKTOR-2). Since CLOVER requires the use of special more expensive TNCs and software, it has not yet been widely used by the cruising community. CLOVER also has improved weak signal capabilities. Because of its high throughput, CLOVER is widely used to transfer data between gateway stations. See Appendix 21 for a list of Clover MBOs.

HF DIGITAL MODE OPERATING TIPS:

- Check out your system and practice digital mode operation prior to "heading south". Link with an MBO to ensure compatibility.
- Listen first prior to transmitting, to make sure you're not transmitting over the top of someone else.
- Reduce power (check your radio manual) to roughly half of full output power, don't over drive (Many amateur transceivers can't handle the longer duty-cycle of digital modes when at full output).
- Use lower sideband (LSB) or the FSK mode position (preferred- except Clover) if available.
- Use Narrow (cw) filters if available (Some radios don't make narrow filters available in SSB modes).
- Adjust IF shift or passband tuning for appropriate center frequency offset (varies by mode/ TNC).

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- Don't use a speech processor or transmit audio compression with digital mode transmissions (turn them off if available).
- Once you link to an HF system, type "H" or "7" for help or assistance.
- Once you are linked, type "LB" (list bulletins) to list all informational bulletins (only if you need them).

EMERGENCY OPERATIONS

Paragraph 97.403 and 97.405 Paraphrased: In an emergency involving the "immediate safety of life or protection of property", an amateur may use any means at his or her disposal to provide essential communications when normal communications are not available.

In addition, "amateurs in such distress" may use any means at their disposal to attract attention, make known their condition and location, and obtain assistance.

Amateurs, "hearing a station in distress" as described above, may use any means of radio communication at their disposal to aid such station in distress.

Planning Ahead For Natural Disasters: Part 97 authorizes a special emergency communications organization called the Radio Amateur Civil Emergency Service (RACES). Ham mariners may wish to review and participate in this public service organization. (Remember one of the basic purposes of amateur radio?)

DISTRESS COMMUNICATIONS



A cruising ham with an emergency will likely use his or her marine VHF or HF radio to first request assistance. See the Emergency Operations paragraph in the Marine Radio Section for specifics. Should marine radio fail to attract attention, if you are beyond the range of marine radio coverage, or if additional help is needed, amateur radio provides a valuable added communications capability.

MAYDAY CALLS ON AMATEUR RADIO

The International Distress Signal is

Voice: MAYDAY, MAYDAY, MAYDAY followed by your distress message.

Morse Code: SOS, SOS, SOS followed by your distress message.

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See the Emergency Operations paragraph in the Maritime Operation Chapter for the complete Distress Message.

In an emergency involving an immediate threat to life or property, a Mayday transmission may be made over amateur radio. Select a frequency for the Mayday call the way you would for any other transmission. That is,

- What band/ frequency are you most likely to be heard on?
- What band do you have good reception on?
- What band gives you the best propagation back to where a rescue effort can best be mounted?

If you can make contact with a MM Net, you are normally in good hands. The Net Control Stations and Relay Stations usually know what to do and who to call. See the Rescue Coordination Center (RCC) Appendix (#5) for phone numbers.

Ham cruisers in distress need to be able to

- Describe their problem in detail
- Specify what assistance is required
- Give a good position so they can be found
- Advise what survival equipment they carry

The best way to do this is to have the Emergency Distress Form in the Appendix (#4, copy 2) posted near your radios. Fill it out and use it to call in your message.

Since the ham operator may become disabled other crew members should be able to operate the ham equipment in an emergency.

Remember the Rescue Coordination Centers (RCCs) are listed in Appendix # 5. If necessary, give their numbers to a helpful ham, or get a phone patch to them directly.

MEDICAL EMERGENCIES

Some regional hospitals will accept collect calls involving an emergency at sea. Remember, you may well be able to get a phone patch directly to a regional medical center. Some centers are trained to provide emergency assistance over the radio. MM Nets are often familiar with which medical centers provide this capability. See also The Marine Radio Service paragraph on medical emergencies.

ADVANTAGES OF AMATEUR RADIO (VS MARINE)

Amateur Radio offers some advantages not available on marine radio. These include

VHF Operations

- Extended range via repeaters
- Phone connections via autopatches (limited business allowed)
- Social conversations/ extended conversations are OK
- Email type text message capability via Packet BBSs.
- Long range communication available via linked Packet systems.

HF Operations

- Many more frequencies for a given band. No long waits for busy channels. (There are only 3 or 4 channels per band on Marine SSB or SITOR.) (You often have propagation to your desired location on only one band.)
- Phone patches (limited business allowed—"no personal gain/ no on-going business activity")
- Somewhat lower cost equipment
- Hundreds of thousands of hams world wide (net relays/ traffic handlers/propagation to someone- somewhere)
- Multi-mode—Packet, AMTOR, PACTOR, CLOVER, etc.
- Essentially world-wide text message services via HF Digital Gateways. (At no per message or air time charge like on marine channels).
- Higher power limits (1500 watts PEP)
- Extended social conversations are OK (discouraged on marine)
- MM Nets- Many cruisers coming together at one time:
 - Real time, on site WX
 - On site harbor information
 - Passage tracking (Daily position reports-some nets)
 - Designated times/ frequencies to meet
 - Social contacts with other cruisers
 - Base station relays-phone patches or message relaying
- No fee for an Amateur License (minimal charge for taking a test)

Additional information on Ham Radio is contained in the Common Information Section and the Appendices.

PART IV. COMMON INFORMATION SECTION

The information in this section applies to both marine and amateur radio operations. It is presented here to reduce repetition.

WX INFORMATION SOURCES

There are a wide variety of sources for weather information available to cruisers. They are listed below with a brief description. See the WX Broadcast Appendix (#15) for specific frequencies and times.

MARINE VHF RADIO

24 hour NOAA VHF local weather broadcasts are available along coastal waters and navigable inland waterways. Locations of these stations are published in the appendix section of the United States Coast Pilot(s). See also the Address Appendix (#2) for NOAA's address.

HF RADIO

There are several ways to obtain weather information via HF/ shortwave radio, if you have a general coverage receiver. Broadcasts include voice, Morse code, automated text broadcasts (TOR, SITOR, NAVTEX), and WX FAX pictures. Personalized weather forecasts are available for a fee from SITOR/ NBBDP coast stations. See the Weather Broadcast Frequencies and WX FAX Frequency Appendices (#15 & 16) for frequencies, times, and locations of these weather broadcasts. See below for details.

VOICE BROADCASTS**US COAST GUARD AND HIGH SEAS BROADCASTS**

There are many stations providing wide area coverage for coastal and high seas areas around North America. There are also numerous world-wide stations broadcasting voice weather. See the WX Frequencies Appendix (#15).

AMATEUR RADIO MARITIME MOBILE NETS

Frequently, local cruising area nets provide the most current source of weather. Boaters are often asked to check into these nets with their current weather. Examples include the Chubasco and Baja California Nets serving Southern California, Baja Mexico, and the West Coast of Mexico. See the Maritime Mobile Net Appendix (#18) for which MM nets provide WX information.

WWV AND WWVH BROADCASTS

The National Institute Of Standards time signal stations provide more than time and frequency standards. They also provide limited high seas weather information on a published schedule. See the WX Frequency Appendix (#15).

AIRCRAFT TERMINAL FORECASTS AND IN-FLIGHT REPORTS

Major airport terminals and airliners provide weather reports which may be monitored by cruisers. These transmissions may have some limited utility for cruisers. See Appendix #15.

WEATHER FAX BROADCASTS (WX FAX)

WX FAX broadcasts are transmitted by the US Coast Guard, Navy, and NOAA WX stations. WX FAX is also transmitted nearly world wide by certain public coast stations. See the Weather Fax Operations paragraph below and the WX FAX Frequency Appendix (#16).

MORSE CODE (CW) WEATHER BROADCASTS

Some public coast stations still broadcast weather information in Morse code. This information is broadcast at different times and on different frequencies from the voice broadcasts. Should interference on a given frequency or poor reception prevail, you may be able to copy the information you need from the Morse code version. Some hams enjoy copying this Morse code weather (about 15-20 wpm) for practice. Some ham mariners use their demodulators/ multi-mode TNCs to copy it automatically. See Appendix #15 for CW frequencies.

USCG CW broadcasts on 500 kHz and USCG HF CW broadcasts have been phased out. SITOR, NAVTEX, and SATCOM links, parts of the Global Maritime Distress and Safety System (GMDSS), are replacing CW operations.

AUTOMATED WEATHER BROADCASTS

Radio Teletype (RTTY) (TOR), SITOR, and NAVTEX broadcasts containing detailed weather information in text message format are transmitted by the Coast Guard, Navy, and some public coast stations. These can be decoded (demodulated) using special commercial demodulator printers or amateur radio multi-mode TNCs, such as the AEA PK-232MBx, MFJ-1278, or Kantronics KAM Plus. Commercial systems are often integrated in a single unit. Amateur TNCs are connected to a PC computer and HF radio. The HF radio must be a high quality set, not an inexpensive shortwave set. Frequency accuracy and stability, multimode capability (CW/ SSB- both USB/ LSB), and excellent selectivity and sensitivity are needed to properly receive these modes. See the Weather Frequency Appendix (#15) for additional details. See Figure 6 for a typical hookup.

Special On-demand reception of standard NOAA weather forecast products are available through some coast stations. Globe Wireless offers special subscription services for on-demand standard NOAA products. You may receive the latest forecasts when and where you want them.

SITOR/NAVTEX WX RECEPTION OPERATING TIPS

Most SITOR WX is received in the USB mode with a negative 1,700 Hz offset from the assigned frequency. Most SITOR WX is transmitted with a 170 Hz frequency shift. Other offsets and frequency shifts are used for other applications, but most North American weather data is sent this way. If available on the receiver, narrow (CW) filters should be used to limit adjacent channel interference. All SITOR/ NAVTEX WX is received in the FEC/ "B" or "broadcast" mode. Actual tuning of the signal is accomplished using Mark and Space indicator lights on a demodulator or a tuning bar on a TNC. Precise tuning to a frequency can vary slightly depending upon the filters and any IF-shift (to match the offset) available on your radio. Ask a knowledgeable operator if you need help.

Most SITOR frequency lists are published with assigned frequencies. The dial frequency or frequency you actually tune to on your radio is offset approximately "minus" 1700 Hz from the assigned frequency. See Appendix #15.

SATCOM LINKS

Several weather information services are available via satellite. For a service fee, local WX charts, personalized forecast services, and special regional information are all available via various satellite service links.

WX FAX OPERATIONS**INFORMATION AVAILABLE**

US Coast Guard, Navy, NOAA weather stations, and many world-wide coast stations broadcast detailed maps, charts, forecasts, and pictures via WX FAX. Coverage is nearly world-wide. WX FAX transmissions provide:

- Current regional maps
- Forecast regional maps
- Current high altitude maps (Jet Stream)
- Current sea-state, wave height charts
- Forecast sea-state charts
- Current sea temperature charts
- Broad ocean area maps
- Satellite cloud cover pictures

WX FAX OPERATING TIPS

WX FAX broadcasts are transmitted in SSB mode. You tune most of them on USB using a high quality general coverage receiver. The frequencies published in most schedules are assigned "carrier" frequencies. The actual dial frequency you tune to, in USB mode, is minus about 1.7 to 1.9 MHz from the assigned frequency. Fine tuning is via flashing black and white lights on a demodulator, a tuning bar on a TNC, or a tune indicator on a computer screen. The WX FAX frequencies in the WX FAX Frequency Appendix (#16) are assigned frequencies.

Electrical hookup for WX FAX is taken from the audio output of the receiver, typically from an "external speaker" jack to the input of the WX FAX machine or WX FAX demodulator(or TNC). It is then run to the WX FAX printer or to the serial interface jack on a PC computer. A computer must also have WX FAX software installed. See Figure 6 for a typical hookup.

Output is either printed on a hardcopy printer or a computer screen. PC-based systems may also print to a file for later call up and review. Transmission schedules for specific charts are printed at designated times for most stations. See also the WX FAX Frequency Appendix (#16).

Interpretation of WX FAX charts takes skill and practice. Often seminars are sponsored by cruiser-oriented marine stores. There are several good books available to assist you. One is the WX FAX manual published by Alden Company.

SHORTWAVE BROADCAST STATIONS

There are many shortwave broadcast stations that provide long range coverage when you are out of the range of regular AM and FM broadcast stations.

Programs: The US and other English speaking countries, as well as many non-English speaking countries provide English language programs on their stations. News, commentary, and music are often enjoyed by cruisers away from their home area. See the Shortwave Broadcast Appendix (#14).

Selection and Tuning: Different frequencies, transmitter power, and antenna arrays are often used by stations to beam specific regions at specific times of the day. For a given station, you may only hear a few of the frequencies listed at any one time. You must search for the best reception for your area and time of day. Generally, use higher frequencies in the day and lower frequencies at night. Lower frequencies are normally better for "close" reception, and higher frequencies for "far" reception. On general coverage receivers (many ham transceivers) the AM or wide filter position must be selected for best AM

broadcast reception. You will find a few broadcast stations outside the bands listed in the Appendix; not all broadcasters follow the international band plan.

EQUIPMENT INSTALLATION ON BOATS

CAUTION: Lethal voltages may be present in radio equipment. Always turn off equipment, and turn off circuit breakers or remove main fuses prior to working on equipment. Follow closely all instructions provided with equipment.

NOTE: The information provided below is of a practical, helpful-hint nature. The American Boat Yacht Council (ABYC) and US Coast Guard establish standards for installations on vessels. Refer to the standards for definitive guidance. Basic safety precautions are listed in any good electrical/ electronics handbook. The ARRL Handbook is an excellent radio technical reference. See also the Safety paragraph below.

There are four primary considerations in ensuring a good radio installation aboard a boat. They are proper equipment location and proper power, antenna, and ground installations.

EQUIPMENT LOCATION

Radio equipment should be out of the way and away from possible spray or splashes. However it must also be readily accessible when needed, especially the marine VHF. It should be readily accessible from both down below and in the cockpit to facilitate use while underway. Some cruisers put external speakers in the cockpit or on the bridge for critical radios. Where access is not readily available from both below and topside, some cruisers install a second radio. Some use a VHF handheld to fill this second radio function. (A handheld is also very useful to talk back to the main vessel from a dingy).

POWER CONSIDERATIONS

Proper size wiring is critical when installing radios on a vessel. A typical 25 watt marine (or ham) VHF transceiver draws about 7 amps on transmit. Number 12 wire should be used, keeping runs short. Number 10 may be required for long runs over 10 feet(both positive and negative leads). Also, for safety and ease of future trouble shooting, follow established color codes, red for positive 12 VDC and black for negative 12 VDC.

HF transceivers, marine or ham, can draw over 20 amps on transmit. Number 8 wire (#6 for long runs over 10 feet) is required to prevent unacceptable voltage drop. This includes both the positive and negative leads.

Often, radios will work fine when the boat is tied to the dock with a battery charger running or when batteries are fully charged. Once you get away from the dock and battery voltage drops a little, a poor installation (wires too small) will

cause a problem. Additional voltage will be dropped (lost) across the small wiring under heavy transmit loads. With lower battery voltage and the drop (lost voltage) across poor wiring, the voltage to the radio may not be enough to operate it properly in transmit mode.

Some cruisers run the power leads for their HF radios directly to the battery terminals or main battery switch terminals. This may eliminate long runs, poor connections, and small wire runs. **Caution:** Be sure to install proper size fuses or circuit breakers, at the battery, for these separate wires (if you install in this manner).

ANTENNAS

VHF ANTENNAS

VHF antennas on vessels, both marine and ham, normally are resonant verticals cut to the proper frequency. Often they are gain antennas, providing 3, 6, or 9 dB of gain. This means that the antennas multiply the power output of the transmitter. Most marine VHF antennas on sailboats are the 3 dB type that double the effective output power. Power boats sometimes install the longer 6 or 9 dB antennas. Each 3 dB of gain doubles the effective output power of the transmitter. E.G. A 25 watt transmitter fed into a 3 dB antenna has 50 watts of "effective radiated power" (ERP).

Since VHF is a line of sight propagation band, VHF antennas work best when high up on the boat, in the clear from surrounding obstructions. Also, since line losses are greater at VHF frequencies, VHF antennas should be fed with low-loss RG 8 type coax (not the smaller RG 58 type).

HF ANTENNAS

Are you loading all your life lines, or using the VHF antenna on HF? There are lots of ways to get the old signal into the air, you just need one that works and works consistently. See also the Antenna and RF Ground Diagrams.

BASIC CONCEPTS

Simple wire or vertical antennas normally operate on a narrow range of frequencies around one best frequency called the resonant frequency. This inherent narrow frequency characteristic can be modified in several ways.

Some antenna systems use loading coils, either single that are changed for each band or multiple loading coils installed as a system and left in place, one for each band used.

A way to use a single antenna (HF whip or random-wire antenna) on multiple frequencies is to fool the transceiver into thinking the antenna is resonant on several different desired frequency bands. Antenna tuners perform this function.

ANTENNA TUNERS

MANUAL ANTENNA TUNERS

Manual tuners must be adjusted by the operator for each frequency change. Some manual tuners have baluns which allow single wire feed of random-wire antennas. When a single wire feed is used from the tuner, this feed wire length is also a radiating part of the antenna system, and its length must be considered when calculating the best antenna length. See the paragraph below on calculating backstay or random-wire antenna length.

Most manual tuners allow feeding antennas with coax. The most often used type is 52 ohm coax: RG 58, RG 8, RG 8X, and RG 213. RG 8, 8X, and 213 types are higher power, lower loss types. RG 8 and RG 213 are larger diameter coax. Using coax feed from the tuner to the antenna can reduce RF inside the boat, thus reducing possible RFI to equipment on board.

MANUAL TUNER OPERATING TIPS

(This paragraph isn't really an installation tip, but it seemed logical to present it here). A number of newcomers experience a little trouble using a manual tuner. Remember that the basic purpose of an antenna tuner is to reduce the reflected power to a minimum. This can also be stated as "reduce your SWR below 2:1". There are several steps in adjusting a manual tuner:

1. Broad Tuning:

- Select the desired frequency on your radio.
- Set the antenna and transmitter knobs on the tuner to mid scale.
- Adjust the inductance knob on the tuner for maximum receive signal or background noise on your radio. (Normally the lower you go in frequency, the higher up you go with letters or numbers on the inductor switch).
- Adjust the antenna and transmitter knobs on the tuner for maximum receive signal or background noise.

2. Fine Tuning:

- Switch to low transmit power ("drive" or "carrier" knob turned down to about 10 watts output) and adjust the antenna and transmitter knobs on the tuner for minimum reflected power or SWR (whichever your meter scale reads) on your SWR meter. There may be some slight interaction. Repeat the process between antenna and transmitter knobs if necessary. Keep transmissions short when reflected power is high.

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- Apply normal operating power and adjust antenna and transmitter knobs on the tuner for minimum reflected power or SWR.

Most manual tuner users record the settings for each band or channel they frequently use. Some mark it right on the tuner, others create a little table of settings. This aids in rapid tune-up, eliminating the broad tuning steps above.

AUTOMATIC ANTENNA TUNERS

There are also automatic antenna tuners which adjust themselves for each new frequency selected. Auto-tuners are sometimes called "antenna couplers" in marine SSB terminology. Auto-tuners automatically tune when RF power is applied (SGC tuner) or when RF power and a control voltage (ICOM tuner) are applied. External automatic antenna tuners used with end-feed whips or long-wires should be installed as near the antenna feed-point as possible. Coax is used from the transceiver to the auto-tuner. The feed from the auto-tuner to the antenna is normally the single wire type. GTO wire, a neon-sign high voltage wire, or solid sparkplug wire are popular.

Whatever tuner is used, the purpose is to match the transceiver to the feed line and maximize power output from the transceiver. This will get it to the antenna so it will radiate into the air and you will be heard. See also the section on selecting an antenna tuner.

Advanced discussion: OK, OK! Yes, the most effective condition (maximum power transfer) occurs when the transceiver output, transmission line, and antenna impedance are all the same. E.G. 50 ohm transmitter output to 50 ohm transmission line to 50 ohm antenna "radiation resistance".

Resonant antennas can offer this matched condition from the transmission line to the antenna. Dipoles and resonant verticals are good examples. That's why having several dipoles on board is a good idea. For ham cruisers typical dipoles would be for 40, 20, and 15 meters. Drooping or "inverted V" dipoles match directly to 52 ohm coax (the antenna has a radiation resistance of 52 ohms) and don't even need a tuner. See the Dipole Antennas paragraph below.

The HF antennas described below are not the only way to skin a cat. They have, however, proven reliable and effective for a number of cruisers. See the ARRL Antenna Handbook or commercial handbooks for additional technical details.

VERTICALS AND WHIP ANTENNAS

Loaded (resonant) verticals are easily installed with a single bottom mount. Their bandwidth is normally quite narrow, and although not required, a tuner is often used to "broaden" the effective bandwidth. The Hustler mobile antenna is a good

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example of a loaded vertical. It uses a separate loaded whip for each band operated. The Spyder vertical uses several loaded tips to accomplish multiband operation without having to change coils when changing bands. Loaded verticals can be mounted on a transom, pulpit, mast head, or other convenient location where a metal counterpoise (artificial RF ground) is available.

Non-resonant whips, such as the Shakesphere Marine HF whip, are used by many power boaters. They are a convenient form of an end-fed random-wire antenna. They offer easy mounting, but due to their length, normally require support to an external bulkhead or other surface. They must be used with a tuner.

Verticals and whips require a good RF ground. See below for the whip diagram. See also the ground diagram.

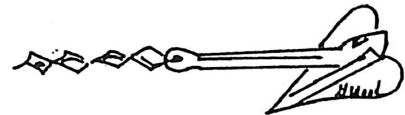
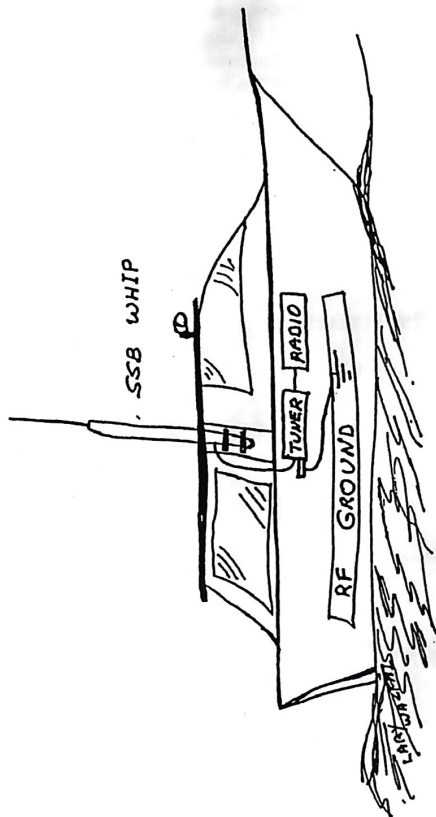


Figure 2. Whip and Vertical Antennas



RANDOM-WIRE AND BACKSTAY ANTENNAS

End-fed random-wire and backstay antennas are a good alternative aboard vessels. They "hear" and "get out" well. They can be permanently installed and generally offer long term trouble-free service.

Backstay and other end-fed random-wire antennas require a good RF ground. Without one, you will not hear nor be heard well!

Backstay and other end-fed random-wire antennas must be fed with an antenna tuner. Either a manual tuner or an automatic tuner can be used. External automatic tuners should be located as near the antenna feedpoint as possible. External automatic tuners use single wire feed line from the tuner to the antenna.

Manual tuners used with backstay and end-fed random-wire antennas may use either the single wire output from the tuner (if the tuner has a balun installed), or the coax feed output (SO-239 to PL 259 connector). If the coax output connector is used from the tuner to the antenna, the coax shield should be connected to the RF ground system at both ends of the cable. See the Antenna Diagrams below for details.



Figure 3. Random-wire/Backstay Antennas--Single Wire Feed

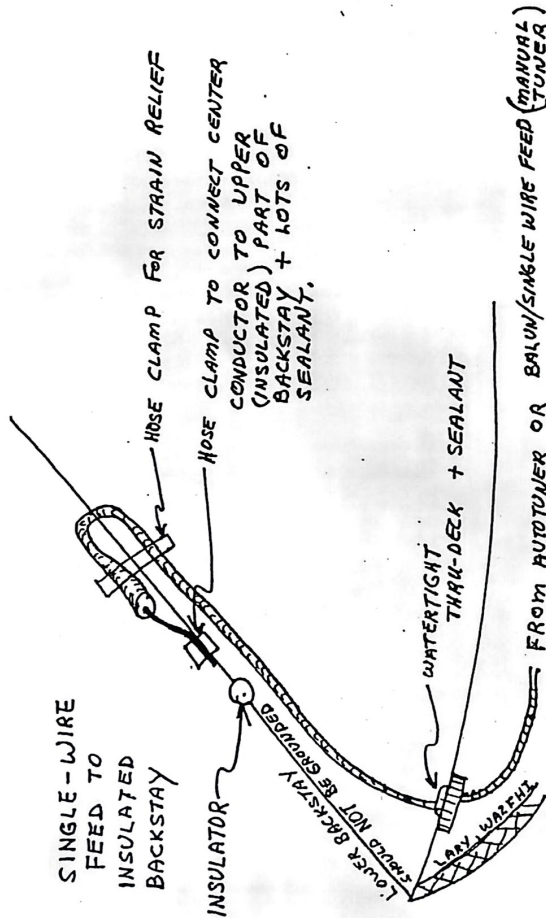
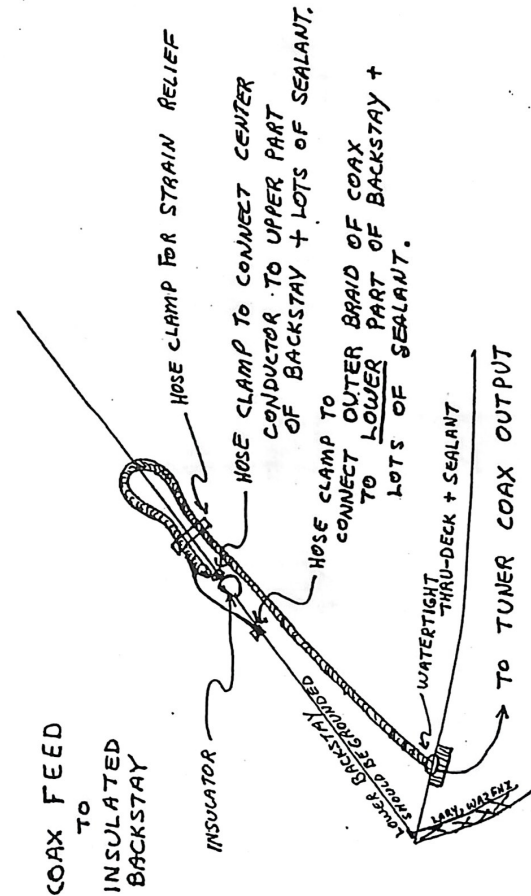


Figure 4. Random-wire/Backstay Antennas--Coax Feed



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LENGTH OF A BACKSTAY OR END-FED RANDOM-WIRE

In practice cruisers have found that antenna lengths from 23 to 75 feet work for them. 38 foot antennas are quite popular. The feedline (from the tuner to the antenna connection) is a part of the antenna for single wire feed systems.

Advanced discussion: (Smoke and mirrors time again, folks? No, not really). Antenna tuners have trouble tuning out very high SWR conditions. End-fed antennas one-half wavelength or a multiple of a half wavelength (on a given operating frequency) have very high SWR (due to a large impedance mismatch).

The idea is to select an antenna length, including feed wire length for a single wire feed (auto-tuners or manual tuner with single wire feed), that is not a half wavelength (or multiple), on any of your planned operating frequencies.

Using the half wave dipole formula below, you can create a table of half wavelengths for your operating frequencies. Will you be operating on both marine and ham frequencies with this antenna? You should consider all marine and ham HF bands if you are.

As with many installations on a boat, you may have to compromise. Select a length that physically fits your installation and stays away from this half wave or multiple half wave problem as much as is practical.

An overall length of forty-nine feet came out as a good compromise length to cover the marine and ham bands and fit the split backstay on my ketch (The 49 feet included 11 feet of GTO wire lead-in, $\{38 + 11 = 49\}$).

I found that, even with over 100 feet of 3 inch copper foil in the bilge, I still needed to install a one-quarter wavelength radial (from the ground lug on the auto-tuner) for 7 MHz. It helped the auto-tuner on 6, 7, and 8 MHz.

WIRE DIPOLE ANTENNAS

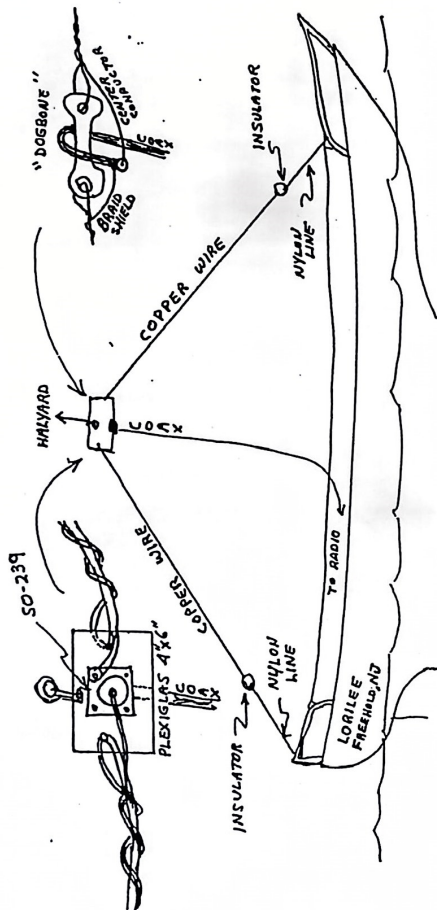
Dipole antennas are very effective and can be put up in either a temporary or permanent installation. You can run them up the flag halyard when at anchor or at the dock, or permanently install them if you have room. Permanent dipoles work well on ketches when strung under the triadic stay. When you feed them with 52 ohm coax and cut them for your operating frequency, you have a very efficient (matched transceiver output, feed system, and resonant dipole antenna = best power transfer) antenna system. They also don't require an antenna tuner, so you're still on the air if your tuner packs it in. Dipoles also do not require an RF ground.

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Dipoles in a horizontal axis are less susceptible to man-made and static noise than vertical antennas such as a whip or back-stay antenna (such as in a noisy harbor). Also, since the radiation take-off angle is different for a dipole versus a vertical, significant differences in transmission and reception quality may sometimes be obtained. Having both and switching between the two can sometimes produce considerable improvement in signal quality. See the dipole diagram below.

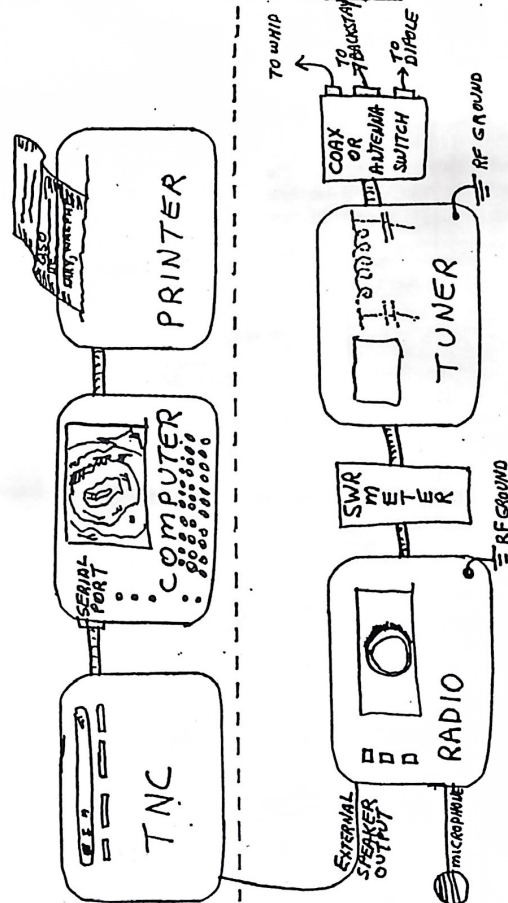


Figure 5. Wire Dipole Antennas



Station Hookup. Putting it all together can be confusing. Here's an example hookup.

Figure 6. Station Hookup Diagram



CALCULATING THE LENGTH OF A WIRE DIPOLE

The formula to determine the length of a half wave dipole antenna is:

$$\text{Half Wavelength} = \frac{468}{F \text{ (MHz)}}$$

Example: 20 meter dipole = $\frac{468}{14.3} = 32.7 \text{ ft or } 32' 8'' \text{ long.}$

On boats there is typically some mast, shroud, or other close metal interaction. This can act to shorten the required antenna length. Therefore the probable length may be closer to 32 feet 4 inches. See the SWR Curve Illustration for trimming an antenna to an exact frequency.

To finish the example, center feeding the dipole with 52 ohm coax, each side of the dipole will be 16 feet 2 inches long.

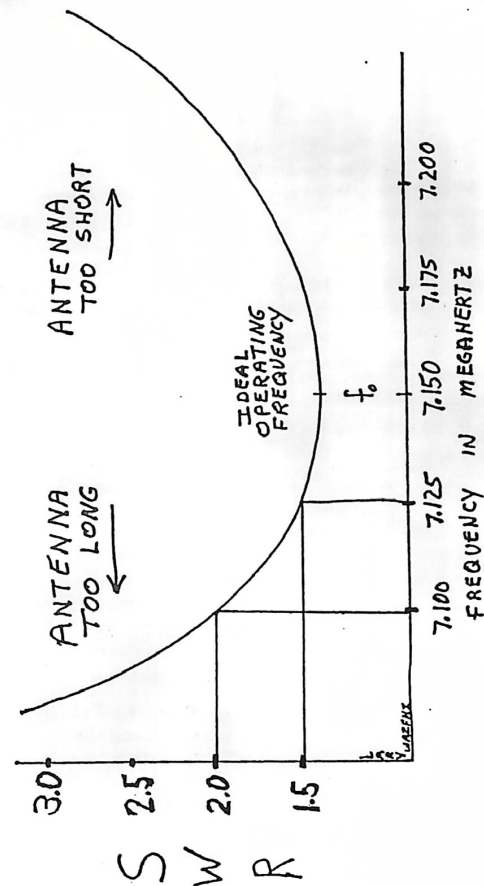
Some typical voice sub-band half wavelengths are

<u>Band</u>	<u>Length (Each Side)</u>
40 meters	32' 1"
20 meters	16' 2"
15 meters	10' 8"

See the Dipole Antenna Diagram below for additional details.



Figure 7. Plotting an SWR Curve/ Trimming A Dipole



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ANTENNA INSTALLATION TIPS

All antennas should be mounted in as free and clear a position as possible. Any close metal objects will affect the radiation pattern of an antenna. Practically, do what you can to keep them in the clear.

The active portion of all antennas should be insulated from any support wiring, other metal, or mounting surface. Some cruising sailors have loaded up their entire rigging and had it work reasonably well. The problem can be that without insulators, in rain, the effective antenna length can change. Also any connection (tumbuckle, etc.) may be mechanically sound but a poor electrical connection. In a heavy wind or seaway, flexing across the connection could generate arcing on transmit and noise on receive. There is also a potential personal shock hazard from loading the entire rigging.

Run the lead-in wire to a backstay antenna in a half loop with the lead-in wire coming down from above at the connection. This will prevent water from draining into the insulation of the feed line. Sealing is a must.

All connections to antennas must be waterproof. Corrosion in a connection will cause arcing on transmit and noise on receive. Seal connections with vulcanizing tape, RTV, or any good sealant. "Coax Seal" works well.

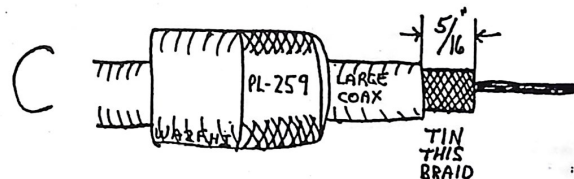
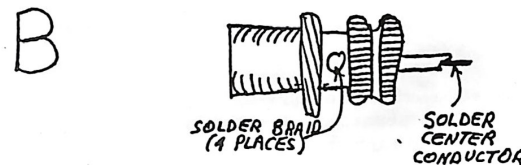
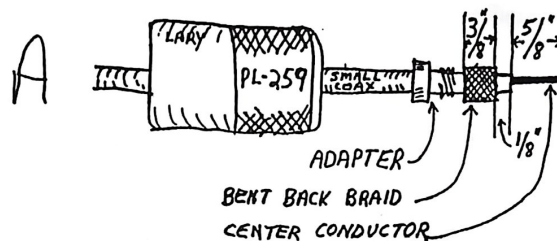
COAX LEAD-IN WIRE

Foam dielectric coax is normally lower loss but in a marine environment can soak up moisture (unless totally sealed at the ends). This can adversely affect both transmit and receive. A good quality coax with high braid percentage (95% and up) in the shield, and a heavy grade like RG 8 or RG-213 is advisable. RG 8X is good for size and power handling characteristics but is made with foam dielectric. Buying a good brand/ quality of coax is advisable (Belden, Anchor {tinned}, Columbia, etc.). This isn't the place to skimp. Deck and mast feed-throughs (Perko) provide waterproof feed-throughs for coax and other cables.

COAXIAL CONNECTORS

Proper soldering of "UHF-style" PL-259 coax connectors is a must. Both the center wire and the shield must be soldered. Proper spacers for the smaller RG 58 or RG 8X coax (UG 175/ 176 U adapters) must be used to prevent flexing and RF leakage. See the PL-259 Connector Soldering Diagrams below for details. Coax connector adapters are available to connect your handheld to your external mast antenna; great for backup should your primary radio bite the bullet. You want the BNC to SO-258 (UHF) adapter. The SO-258 is the female side (of an adapter) for the standard PL-259 (UHF) plug. (The SO-239 is the standard chassis-mount female side for the PL-259). Coax-Seal and weather proof slip on covers are available for coax connectors installed out in the weather.

Figure 8. Soldering Coax Connectors



RADIO FREQUENCY (RF) GROUNDS

A poor RF ground is probably the biggest problem cruisers have in their HF radio installations. RF ground is sometimes confused with DC negative or the shore power safety (green wire) ground. It is neither of these.

An RF ground may be thought of as part of the antenna system. The point to remember is, many antennas, including verticals, whips, or end-fed random-wire antennas (HF whips on power boats, backstays on sailboats), require the use of an antenna tuner, and an RF ground. The RF ground is truly one-half of the antenna system. There is no way to have a "killer signal" with these antennas without having an effective RF ground.

CREATING AN RF GROUND

There are a number of ways to get a good RF ground. Creating a counterpoise with copper screening (solder all wire ends on two sides of any screening used) or using runs of 3 inch wide foil is one method, installing in-the-water through-hull dynaplates is another, installing a 1/4 wavelength radial for each band used is another (use insulated wire and always insulate the distant [high voltage] end of the radial), and tying all large metal equipment together (engine, water tanks, hydraulic control lines, lead keel on a sailboat) is another. Most mariners end up with a combination, using whatever works best with their boat and installation. Install as much as practical.

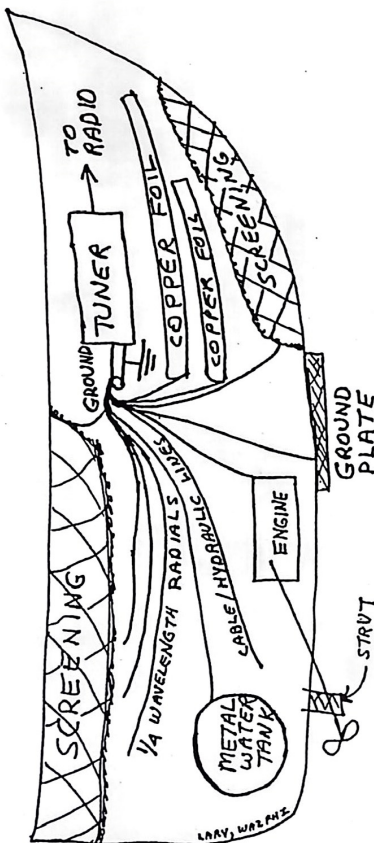
RF energy travels on the surface of conductors; therefore, you should use wide copper foil or heavy braid to interconnect items used for an RF ground. Copper foil is preferred, since braid may develop corrosion between wires and generate noise in your receiver. Braid may be a good choice when connecting a moving object, such as the engine, to the RF ground system. A number 12 wire run to a keel bolt may provide a reasonable ground for a LORAN or other receiving antenna (although not great). It does not provide a good RF ground for transmitting. It is very important to have a good RF ground for most transmitting antennas. Seal connections in the ground system to protect them from corrosion. See the RF Ground Diagram below for further details.

RF Ground Testing Tip. How do you know when you have an effective ground? Take a good size (12" by 12" or more roughly) scrap piece of metal, connect it (good electrical connection) to some heavy wire (# 8), and toss it overboard while at anchor or dockside. Connect it to your existing ground system. Does your receive signal strength improve on your HF radio with this temporary ground? If it does you probably need to work on your ground system some more. Perhaps you've just found an easy solution for when you're not underway.

RF grounding is an area where there is still some magic involved. If you are having trouble with a ground system, seek out the advice of a knowledgeable ham cruiser or qualified marine electronics technician. Many hams are willing to help share what they've learned "the hard way".



Figure 9. RF Grounding Techniques

**POTENTIAL INSTALLATION PROBLEMS**

Caution: Dangerous voltages may be present in radio and other equipment on board a vessel. See the instructions and note at the beginning of the Installation Section. Follow closely all instructions supplied with equipment.

NOISE FROM ON BOARD EQUIPMENT

Equipment on board your vessel may cause interference to your HF radio. Anything with brushes in it, such as a motor or an alternator, is a common culprit. Special power line filters are available from radio or marine stores for your radio's power leads. Be sure to get one that will handle the amperage you're using (7 amps for a 25 watt VHF, 11 amps for a 50 watt ham VHF, and 20 amps for an HF). Also, cleaning or replacing the brushes of the culprit should help. Adding a .01 MFd. disc ceramic capacitor across the negative and positive terminals of an offending motor (better-across the brushes) can help. Be sure to use the proper working voltage- 50 WV for a 12 VDC system. Check with a marine repair service or other knowledgeable individual.

Special line filters are available from your marine store for your engine alternator. Be sure to get the right size for your alternator (50, 100, 150 amp versions). Alternator filters should be installed as close to the alternator as possible. Connect the ground post on the filter to your RF ground system.

Any poor connection in your electrical system can potentially generate noise in your radio. If you have persistent unexplained noise, try to isolate it to a particular system or power circuit. Turn off circuit breakers or equipment while the interference is occurring. Then look for dirty, corroded, or loose connections in the guilty circuit. Check various power sources. Does it occur when you are connected to shore power? Is the noise coming from the shore power line? Is it present when you're on batteries or genset?

Some 12V to 110V inverters create "hash" heard on HF receivers. Try turning your inverter off. If the noise goes away, you can keep it off when on the radio or put filters in the line. In-line (output) power line filters are available at most electronics stores. Be sure to get ones large enough (amperage) for the equipment you're running.

Most fluorescent lights cause heavy interference to HF radios. This is particularly true on the lower frequency bands. Some cruisers have found that Alpenglow or other low noise lights reduce or eliminate this interference.

Some high current battery chargers do not filter out the 60 hertz AC hum coming from shore power sources. This can feed into radio circuits, particularly when transmitting on high power. Some cruisers simply turn off these chargers when

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transmitting on their radios. Knowledgeable people can add additional filter capacitors in the charger output circuit. Discuss the problem with the manufacturer.

RADIO FREQUENCY INTERFERENCE (RFI)

Does "Charlie" the autopilot make hard turns to port whenever you key your HF transceiver? Does a display panel think it's Christmas time when you transmit? Sounds like you may be suffering from acute RFI. Take heart; you can slay this dragon! Advice: Cure any auto pilot RFI problems before you "head south".

The basic corrective action for RFI is to keep it out of sensitive electronic equipment. No really, don't let the stuff into electronics, and you won't have the problem. There are several ways to keep RFI out of equipment.

EXTERNAL RFI FILTERS

The easy way to reduce RFI in equipment is to install external filters on wire leads going into the equipment. How do you tell which lead-in is at fault? Well, you can unplug them individually (turning power off each time) to see when the problem goes away, or just "shotgun" the problem and protect them all.

Ferrite rods, toroid coils, or snap-on ferrite chokes are easily installed on lead-ins without going "inside" the equipment. The rods or chokes are available from many electronics hobby stores. Radio Shack sells a nifty snap on choke (pack of 2) for around \$5.95. Its catalog number is 273-104. MFJ also sells a multi-pack of snap on chokes (MFJ-701 order #). You merely wrap several turns (see the instructions) of the lead-in wire (signal wire, power lead-ins, speaker wire, control cables, etc.) around the choke or rod. That's it. You have created an RF choke which inhibits the passage of HF RF energy without bothering the power input or signal that's supposed to be there.

INTERNAL RFI FILTERS

Caution: Always unplug or disconnect equipment prior to working on it!

For more persistent problems you may have to install several external chokes or install additional filters internally. Internal filters include small ferrite beads (several wire sizes and permeabilities for different frequencies are available). With the beads, the wire in question is merely slipped through the ferrite bead. You may have to unsolder a wire to get an end free, but that's all there is to it. Split beads are available so you don't even have to unsolder the wire. Again, you merely install filter bead(s) on the lead-ins experiencing a problem. Palomar Engineering in Escondido, CA is one good source of ferrite beads.

Another internal filter (or one that can be used on an external terminal strip) is the disc ceramic capacitor. A 0.01 MfD disc ceramic capacitor is an effective

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filter for HF frequencies. Trim the capacitor leads to about 1/2 inch. 50 working volt (WV) sizes are adequate for 12 volt DC equipment. 1000 WV sizes are required for 110V AC power lead-ins. The capacitors are installed from the active wire to chassis ground, keeping the capacitor leads short. Disc ceramic capacitors are available at most electronic hobby stores.

In the most persistent problems you may have to resort to full shielding of the affected equipment. This amounts to enclosing the equipment in a metal shield, which is then grounded. Proper air flow can still be maintained for electronics; just keep holes small, using as many as necessary for proper cooling. There are several books available on RFI. The FCC and the ARRL both publish pamphlets on RFI. See the Address Appendix (#2) for addresses.

EQUIPMENT SELECTION

There are many excellent brands of equipment on the market. When brands are mentioned below, they merely point towards possible sources. FMS Services offers consulting for equipment acquisition. See the Address Appendix.

MARINE EQUIPMENT

There are several considerations for marine gear. All equipment used on marine frequencies must be "type-accepted". Marine gear, in general, is more automated with less operator interaction required (vs. ham gear).

VHF MARINE

There is a variety of models, prices ranges, and qualities available. This is a pocketbook decision. Keep in mind, your marine VHF is the radio you will normally use most frequently. Prices new range from around \$150 up to \$600 dollars or more. Some factors to keep in mind:

- All radios should automatically switch to 1 watt on channel 13 and 67, the navigation, bridge to bridge, channels.
- Most new radios today have reasonable receiver sensitivity (ability to hear a weak signal). It doesn't hurt to ask the dealer, however.
- Good selectivity (adjacent channel rejection) and image rejection are vital in congested boating and metropolitan areas. Without good selectivity, a boat close to you using high power on a channel close to yours will swamp your receiver, and you will be unable to hear your desired station. You will merely hear a pervasive hissing noise. With poor image rejection, out of band commercial transmitters can be heard on your radio and totally wipe out any marine transmissions. With poor image rejection, this interference can occur even though the commercial business transmitter is operating properly. In San Diego a digital pager

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operating properly on a business band has plagued some boaters for several years. Ask a knowledgeable dealer.

- A water resistant radio is always good aboard a vessel.
- For long range cruising, you'll want a radio that also operates on international channels.
- Channel scanning and dual-watch features offer convenience and are particularly useful in congested areas. They allow you to monitor several channels at a time.
- Boaters looking for new equipment should consider DSC class D capable radios. For cruisers, DSC is becoming more and more essential in the near future.

HF MARINE

Your HF radio is your communications link for long range communications. See the Propagation Section below for a description of distance ranges for various channels. Prices for new radios range from around \$2200 (including auto-tuner) on up, depending on other specialized equipment you desire. Used equipment with an auto tuner may range from around \$1100 on up. The decision to buy and process for choosing HF radio equipment is similar to selecting other long range cruising equipment. The decision process is defined by your

- Style of boating,
- Planned cruising grounds,
- Communications requirements, and of course,
- Pocketbook.

The solution lies in addressing the following:

- Do you cruise with a minimum of electronics or must you have the latest equipment?
- Where are you cruising? Are you lake or river, coastal, or blue water cruising? Do you harbor-hop or make long passages?
- Do you want or need to keep in contact with people "back home," just others in the local area, or no one at all?
- What does your budget support? Can you spend \$1000 or \$5000?
- What services will you want to use? High seas telephone, USCG weather broadcasts, listen to ham nets, listen to shortwave broadcasts, copy WX FAX, operate SITOR text message service, connect to internet via enhanced digital modes, etc? The special modes all require special

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equipment. Listening to shortwave broadcasts and time signals requires a radio with a "general coverage" receiver.

HF EQUIPMENT FEATURES

When considering the selection of an HF radio, consider your own preferences and operating style. Do you like everything to be automatic or do you prefer manual controls for various functions? Do you like "bells and whistles" or a minimum of "messaging around"? Choose a radio that compliments your style of operating. One advantage of an HF marine radio is that it is very stable and accurate frequency-wise (required for type acceptance). A potential disadvantage of many marine radios is that they don't "tune around" easily (with a tuning knob-for use on the ham bands). Some specific equipment features to consider are

- Ease of operation:
 - frequency/ channel selection
 - mode selection
 - modes available- LSB required for ham
- Large number of memories for your favorite frequencies
- Good sensitivity
- General coverage receiver- shortwave broadcast, time signals
- Noise blanker installed
- Amateur frequency usage- listen to nets (WX, etc.), emergency calls to nets
- Warranty, service availability, manufacturers reputation
- Display:
 - Information outlined on display
 - Frequency, mode, usage
 - Easy to read
- Quality of instructions in equipment manual
- Direct access to 2182 kHz emergency frequency
- Corrosion resistance treatment
- A DSC class E capable radio (**This is more and more important in the near future**)
- A radio pre-wired with audio input/ output jacks for SITOR/ NBDP digital mode operation (Some radios don't have this option available)
- Good selectivity-narrow (500 Hz) filters for SITOR/ NBDP digital mode operation (Some radios don't have this option available)

ICOM, Furuno, Kenwood, SGC, Raytheon, SEA, and a number of others offer good quality marine HF SSB radios. Again, the selection process is based upon your personal needs, operating preferences, and intended use. A comparison of

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features available to dollars spent is a very worthwhile exercise! A hands-on demonstration by a friend or dealer can be very helpful. Make sure your new radio is capable of operating on all modes you intend to use.

AMATEUR EQUIPMENT

Amateur equipment comes in all sizes, shapes, price ranges, and with an assortment of "goodies" (features/accessories). Like cars, new models come out frequently with new improved goodies. Equipment selection, as with marine equipment, depends upon your operating needs and style and your pocketbook. Many hams like to maintain control over various functions and features. They enjoy having manual control to select features and functions to suit conditions (vs. automatic control, such as auto-tuners).

VHF HAM

There are several considerations for ham 2 meter VHF equipment used by cruisers. If you are traveling in congested areas, you will probably need PL to get into tone access systems. A fair number of memory channels are desirable. Radios that memorize the PL frequency and offset frequency (normally + or - 600) as well as the repeater frequency are very nice but not essential. If you use autopatches, you will need a touch-tone pad. A radio with a general coverage receiver to monitor the marine channels and one capable of transmit expansion (for emergency use only) is very nice. Water resistance is good. Radios with 25 or even 50 watt output are good for fringe area coverage. For handheld use aboard a vessel, a 12 volt charge option is very handy (spelled "necessary" when away from the dock).

HF HAM

Again, how you are going to use your radio and what you can afford, play a big part in the selection process. Hams considering purchasing a marine SSB radio for use in both services should insure that it tunes in at least 100 Hz steps, and a dial/ knob tuning capability exists. (Discreet Kilohertz step tuning like the ICOM M-700 is difficult to use on ham frequencies where stations/ nets may be operating between kHz steps. E.G. 14.340. 50 MHz. Also, constant frequency changes with only a touch-pad is difficult.) Such radios are excellent for marine usage, but may not be appropriate for "frequent" ham band usage. See the comments for marine HF equipment above.

HF EQUIPMENT FEATURES

Some considerations, in no particular order, include (see also marine HF selection above):

- General coverage receiver shortwave-- WX FAX, shortwave broadcast, etc.

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- All band coverage-- 160 - 10 meters (WARC bands-30/17/12 meters?)
- Selectivity-- crystal filters, band pass, IF shift, notch filter
- Digital readout-- 2 digits past decimal point (recommended accuracy-- to 10 Hz)
- Dual VFOs
- Memories--large number, duplex (split) capable
- Multi mode--CW, USB & LSB, RTTY, FM, AM, FSK
- Extended transmit-- marine frequencies--for emergencies
- Warranty, service availability, manufacturers reputation
- Good sensitivity
- Compact--for boat installation
- Corrosion resistant
- Quality of the operations manual
- 12 volt operation
- Built in SWR meter
- Speech processor
- Attenuator
- AGC Control(slow/ fast--for digital modes)
- HF digital mode friendly--FSK mode (for RTTY/AMTOR/FACTOR--nice not required), audio input/ output on rear panel jacks(to/from TNC), narrow (500 Hz) filters available in LSB and/ or FSK mode, rapid transmit/ receive turnaround time (around 10 MS), a very accurate(10Hz) and stable (less than 30 Hz per hour drift) receiver, etc.

ANTENNA TUNERS

Have we heard this before? How will you use it? What bells and whistles do you want? Tough to know when you're brand new at it. Some considerations for both marine and ham usage include:

MANUAL TUNERS

Some features to consider are

- SWR Meter included--nice--need one somewhere
- Antenna switch included-- nice to have
- Balun included--good to have for single wire feed
- Size of inductor--number of tap positions on inductor switch-- more taps = greater tuning range
- Overall quality of components--power handling capability (300 watts minimum)
- Physical size--fit your installation
- Reputation of manufacturer
- Quality of instruction manual

AUTOMATIC TUNERS

Automatic tuners are a luxury to some, absolutely essential to others. If you don't like or want to mess with adjusting a manual tuner, they are a great convenience. As with many conveniences they are expensive. Many marine radio users who simply want good communications back home, without hassle, select automatic tuners.

Selection is pretty straight forward. The SGC works with most any radio; ICOM works with ICOM (some model dependency exists--check); Kenwood works with Kenwood, Alinco works with Alinco, etc. Modifications can be made; but if you're looking at auto-tuners, you probably aren't interested in messing with mods.

One special note, the auto-tuners built into or offered as add-ons to some ham transceivers work fine to compensate for small or medium SWR conditions but don't have the capacity to handle very large SWR conditions (above say 5 to 1 or higher). End feeding a random-wire or backstay can create this very high SWR condition (E.G. when the antenna is near a half wavelength on the operating frequency). Many cruisers have better results with the larger capacity external auto-tuners (SGC).

Some fanatical hams use both manual and automatic tuners. They like the convenience of the automatic tuner and the flexibility and control of the manual tuner. See also, antenna tuner installation tips above.

ANTENNAS

Verticals and whips should be "marinized". That is, made of stainless steel, including all mounting hardware. Loading coils should be sealed.

SAFETY CONSIDERATIONS**SHOCK/FIRE HAZARDS**

Caution: lethal voltages may be present in radio equipment.

All radio equipment must be protected with proper size fuses or circuit breakers (consult your equipment manual for sizes). Connections should be tight and covered. Radios draw high current on transmit. Too small a wire, unfused leads, poor connections, or bare wires, all present a fire and/or personnel hazard. Consult a basic electrical or electronics guide for complete safety guidelines.

LIGHTNING HAZARDS

Some cruisers install antenna lead-in quick disconnect and/or static discharge devices to protect their radio equipment. For single-wire antenna leads, knife switches are available from some radio or electrical stores. Some cruisers install

them in the line between tuners and antennas. They are opened whenever lightning is present or the boat is left for extended periods.

Static discharge protective devices like the "Blitz Bug" or the better "gas-discharge" devices, offer some protection against near field lightning strikes and static buildup. They install easily in coaxial lines, are relatively inexpensive, and are available in many radio stores.

When lightning is present in the immediate area, all leads to your radios should be disconnected. (This applies to all electronics).

RF HAZARDS

HF antennas should be located so there is no chance of receiving an RF shock through accidental contact while transmitting. Backstay antennas can present a particular hazard. The lower insulator and lead-in connection should be high enough so that a person grabbing the stay for a handhold, won't grab the active section during transmitting. Plastic shroud covers offer a possible alternative protective cover for active portions within reach.

VHF antennas used with high power transmitters (above 10 watts) offer potentially hazardous levels of RF radiation. Since VHF is easily absorbed by body tissue, VHF antennas should be kept away from the immediate areas where people normally stand or sit.

MAINTENANCE

Caution: Lethal voltages may be present in radio equipment.

"Opening up" a piece of equipment is best left to knowledgeable individuals. However, if you have the background or are stuck in some remote area, you may wish to try these hints. Hams and cruisers tend to be pretty self sufficient people.

TROUBLE SHOOTING TIPS

This paragraph provides some helpful hints for common problems seen by cruisers. Although proper test equipment and circuit knowledge are required for major problems, simple fixes can resolve many common problems. The descriptions, problems and solutions are

Poor Reception/ Weak transmitted signals

- Install good RF ground system
- Check for moisture/ corrosion in coax end connectors
- Bad/ broken lead-in connections- Check for high SWR

Poor Modulation (Transmit Audio) (The most common problem, and illegal signals can be generated!) -

- **"FMing"** (garbled audio)
 - Low voltage to radio (Most need a minimum of 12.0v--at the radio)
 - Charge batteries
 - Check for bad power lead connections
 - Use larger power leads
- **"Distorted"** (distorted audio)
 - RF in mike circuit- a tearing sound
 - Install RFI filter in mic. lead (See RFI above)
 - External filter choke
 - Internal ferrite bead(s)
 - Internal .01 MFD disc capacitor
 - Wrap mike cord in tin foil (temporary)
- **"Flat Topping"** (over driving) (Newcomers biggest problem)
 - Reduce microphone gain and/or drive level-- so ALC meter is just moving, or voice peaks are about half of rated output (50 watts for 100 watt radio)
 - Have a friend some distance away listen as you adjust your set
- **No Transmit Audio/ Noisy Transmit Audio** (Very Common Problem)
 - Check for corroded mike. plug connector
 - Check for broken/ loose connection at mike. plug
(Common at strain relief point--Stretch and twist the cord while transmitting. Have a friend listen.)

Hot Mike. (RF on Microphone/ Radio)

- Install 1/4 wave radial(s) for each band where RF is present on surface of equipment (Use insulated wire)

High SWR/ Reflected Power

- Check for broken/ corroded connections
- Install good RF ground
- Trim resonant antenna to operating frequency
- Install good tuner for non-resonant antennas

Non Resonant Antenna-Won't Tune (On Some Bands)

- Install 1/4 wave radial for each problem band
- Change length of lead-in wire slightly

Note: Manual and automatic antenna tuners have trouble tuning out very high SWR conditions. End-fed random-wire antennas exhibit very high SWR at frequencies where they are a half wave or multiple of a half wave. See the paragraph above on determining the length of an end-fed random-wire/ backstay antenna.

RADIO EQUIPMENT TOOLS

A small soldering tool, rosin core solder (never use acid core solder on electronics), small screw drivers, small thin nose pliers, small side cutters, jeweler's screw drivers, and a sharp pocket knife are desirable for small electronic fix it jobs. A desoldering tool (solder sucker, etc.) is also useful when fixing equipment.

A Volt-Ohm-Meter (VOM) and SWR/ Power meter (even an inexpensive CB type will work) are very useful instruments for trouble shooting common problems.

RADIO ACCESSORIES

Having some relatively inexpensive accessories can make your operation much easier. Good quality antenna switches such as the Daiwa CS-201 or the MFJ-1702B are very handy. Don't bother with the "cheapy" variety. They won't handle the power, maintain proper impedance, or last very long. A BNC to SO-258 (UHF) coax connector adaptor is very handy to connect handheld radios to external VHF antennas should the main VHF fail. (Some hams use their masttop marine VHF antennas for 2 meters. Most seem to have an SWR of about 2.2 to 1 or less on 2 meters-- acceptable for short periods.) Lightweight headphones are a valuable addition to allow radio usage while crew members are sleeping. Using a low-pass filter on HF to prevent TV interference can keep your boating neighbors happy.

RADIO SPARES

Extra fuses for all equipment, extra coax connectors and adaptors, extra batteries (portable operation or memory backup), an extra length or two of coax (an emergency dipole should you lose the rigging), some extra antenna wire (lamp "zip" cord works well), and extra egg insulators are all desirable. Standard spade and butt connectors for power leads are also needed. A few switches and several sizes of wire are also useful.

PROPAGATION TIPS**VHF PROPAGATION**

VHF propagation is essentially "line-of-sight". That is, if you can see it, you can talk to it. Radio wave line-of-sight is actually a little farther than visual. Typical ship-to-ship range on VHF (simplex) is about 25 miles. Ship-to-shore range can go as high as 50 or 75 miles if a high antenna is used on shore.

"Skip" conditions can occur through ducting or other special propagation effects. Range during these temporary, unstable conditions can go as high as several hundred miles.

MF PROPAGATION

Medium frequency propagation during the day is generally "ground wave" type. The typical range for MF ground wave is about 50 to 100 miles. Range at night can go much higher to a thousand or more miles.

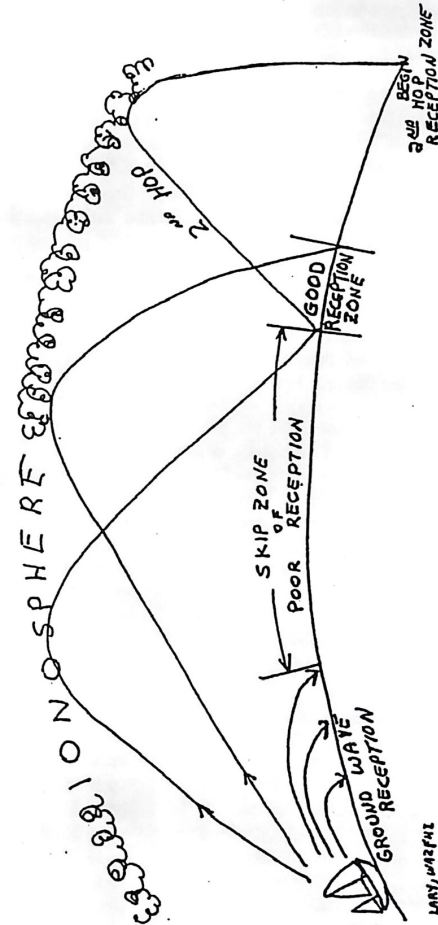
HF PROPAGATION

Most HF contacts are made via "skywave" propagation. Skywave signals are bent or refracted by the ionosphere back down to the earth a considerable distance from the transmitter site. The "skip zone" is the area between the transmitter site and the point where the skywave returns to the earth. Little signal is received in this skip zone; therefore, communications are normally not possible.

The ionosphere changes dramatically from day to night, summer to winter, and over the 11 year sun-spot cycle. The effects are that skip conditions fluctuate considerably. General predictions can be made for propagation, but specific conditions for a given band are changeable.

The ionization process affects each frequency band differently. Each frequency is refracted at a slightly different angle. If you can't hear your station on one channel/ band, you may be skipping over or under your station. Try a lower or higher band, and skip may be just right to your distant location. See the HF propagation diagram below.

Figure 10. HF Propagation--Skip



HF PROPAGATION TIPS/ SELECTING A BAND

Rule 1: Frequency/ band selection is somewhat of a trial and error process.
"Mirrors and smoke are involved here."

Rule 2: Just when you think you understand, propagation conditions will change.

It's not really that bad! You will develop a feel for it. There are some Band Selection "Guidelines" to help you.

- Use higher bands during the day, lower bands at night.
- Propagation on a given band, especially higher bands, tends to follow the sun-as the earth rotates (a higher band may be "open" with the sun up).
- Select the highest band you can make contact on for your distant location.
- The higher the frequency, the greater the distance covered.
- Listen, listen, listen:
 - Who are you hearing from where? If you can hear them, you should be able to talk to them.
 - High power shore stations, using gain antennas reach farther than ship stations. You may not be able to reach back to some of them, even though you hear them.
 - What frequencies are you hearing WX broadcasts, high seas operators, time signals, or shortwave broadcast stations on from your desired area? You should be able to reach back in their direction on similar frequencies.
- Practically, there is a highest usable frequency that varies with daylight and the seasons. (For you propagation nuts- this is where the least absorption occurs, the Maximum Usable Frequency {MUF}). Above this frequency, usable communication does not occur. The "optimum" frequency is slightly below the MUF. The daily Solar Flux Index is given on WWW (an indication of propagation conditions). See the HF Frequency Appendix {#12} for times.

"Typical" Frequency Band Usage: (See rule 1 and 2 above)

<u>Band</u>	<u>Daytime</u>	<u>Night Time</u>
2 MHz/ 160 mtrs.	Local - 100 mi.	up to 1000 mi.
4 MHz/ 80 mtrs.	Local - 200 mi	up to 1500 mi.
6/8 MHz/ 40 mtrs.	300 - 700 mi.	up to 2500 mi.
12 MHz	500 - 1500 mi	up to 3500 mi. *
16 MHz/ 20 mtrs.	800 - 3000mi.	up to 7000 mi. *
22 MHz/ 15 mtrs.	2500 miles/ up	up to 10000 mi. *
25 MHz/ 10 Meters	3000/ up, if open	closed nights.

* Note- may be closed (no propagation) at night.

Actually there are a number of predictable propagation modes that are described in handbooks. Short Path, Gray line, Transequatorial, Backscatter, Long path, etc. are all known and predictable propagation modes. Considerable information is available if you're interested. Ham DXers study this stuff by the hour.

CHOOSING BETWEEN MARINE OR AMATEUR RADIO

By now you've probably read a number of times that equipment selection is a function of your communications needs, cruising style, planned uses, and operating preferences. Choosing which way to go also involves making a decision whether you want to study and mess with taking those time consuming ham tests and learning the Morse code. Advice--If you decide to become a ham, don't wait until the last minute.

It should help to review the Advantages of the Marine and Amateur Service paragraphs listed at the end of each respective chapter. You may want to review the recommended list of features for each radio service listed in the Equipment Selection paragraphs above

In the end your decision often boils down to, do you look at radio as a "fun, hobby kind of thing", or just a "tool to get other things done"? You might ask yourself, do I enjoy "messing with the stuff" or just want to "use it and get on to other, more important things"? Hopefully you can make a logical decision, one based upon knowledge, after reviewing this guide.

In either case, the guide will help you in your radio operations.

Fair winds and 73s,

de Roger K0YY (ex W6SOT), previously of SV Fantaseas.

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APPENDIX 1. CRG GLOSSARY

Notes:

1. Terms are annotated to show which service they are used with: (ARS) = Amateur Radio Service, (MRS) = Maritime Radio Service, or (Both).
2. Only terms used in the Guide are described here. There are many hundreds of terms used by the two services and in the radio industry. Consult a good electronics or communications handbook for details. See also the MM Net Special Terms Appendix (# 8).

A

AFSK (Both)-- Audio Frequency Shift Keying. Used for data transmissions using several tones. Generally the tones are generated external to the radio and feed as audio to the radio. See the Emissions Appendix (# 6) for additional details.

AGC (Both)-- Automatic Gain Control. An automatic circuit in a receiver, used to maintain a constant level of gain even though the incoming signal may be varying in strength. "Slow" is the normal mode used for voice. "Fast" is used for RTTY (AMTOR / SITOR) and Data (packet) transmissions.

AM (Both)-- Amplitude Modulation. An older, quite broad type of voice modulation. Used by shortwave broadcast stations.

AMTOR (ARS)-- Amateur Teleprinting Over Radio. A communications mode capable of transferring messages between stations. Uses special error correction techniques (ARQ and FEC). Similar to marine SITOR in format.

AMVER (MRS)-- Automated Mutual Assistance Vessel Rescue System. A system where commercial vessels report their positions to the Coast Guard, and if a Mayday is reported, nearby vessels are notified to offer assistance.

ARQ (Both)-- Automatic Repetition On Request. One error correction mode used in AMTOR/ SITOR transmissions. Also known as "A" mode. An interactive mode, feedback from a receiving station is required. See also FEC mode.

ARRL (ARS)-- American Radio Relay League. The nationwide Amateur Radio membership organization. Offers many membership services, publishers of QST

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Magazine; A Volunteer Examiner Coordinator (VEC) organization registered with the FCC.

ASU (MRS)-- Associated Ship Unit. Usually a handheld radio unit operated from a tender or dingy, used to talk with its own "mother" ship. No additional station license is required for an ASU.

AT&T (MRS)-- American Telephone and Telegraph. A commercial corporation, one division of which provides MRS public coast station services.

Autopatch (ARS)-- A device attached to a repeater system which interconnects the repeater to telephone service. Controlled by touch-tone commands.

B

Band (both)-- Designated range of frequencies within which operation is authorized. E.G. HF or VHF, or a more narrow usage, the 40 meter ham band.

Bandwidth (ARS)-- The effective or usable range of a resonant circuit, band-pass filter, transmitted signal, or antenna. For an antenna, the frequency range either side of the resonant frequency where the SWR is below 2 to 1.

BBS (ARS)--Bulletin Board System. Text messages can be left for future pickup from one operator by another. See also mailbox.

C

CLOVER (Both)- An HF digital mode. Very good error correction, high speed. Can pass computer file, binary information as well as text.

Commercial Vessel (MRS)-- See CFR 47, Part 80, paragraph. 80.5 f.
Paraphrased-- A vessel involved in passenger or cargo hauling, fishing, etc., for hire or as part of a business. E.G. A "Compulsory" vessel required to carry certain radio equipment. Uses "commercial" working channels on VHF. See VHF Frequency Appendix.

CW (Both)-- Continuous Wave. Morse Code, carrier on/off mode of transmission with no modulation.

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D

Data or Digital Mode (Both)- Transmission modes which pass information in text and or computer file format(non-verbal). Requires special hardware and software. See RTTY, AMTOR, SITOR, FACTOR, Packet, Clover, etc.

Demodulator (Both)-- A device used to decode special transmission modes like SITOR, WX FAX, NAVTEX, etc. Also known as a TNC in amateur radio usage.

DSC (MRS)-- Digital Selective Calling. An automated call-up communications mode. Both HF and VHF. An ID is required for each station using this service.

Duplex (Both)-- In radio communication, a type of transmission indicating simultaneous two way traffic using *two channels or frequencies*. Half duplex indicates first one side then the other transmits. It is used on marine high seas operator frequencies (MRS). Ham repeaters normally use half duplex mode with separate transmit and receive frequencies (ARS). The telephone is an example of full duplex, both sides may talk at the same time. See also simplex.

E

F

FAX (Both)-- Facsimile. A mode of transmission used to transmit picture, graph, or chart-type data. Used in MRS to transmit weather maps and satellite pictures.

FEC (Both)-- Forward Error Correction. One mode used in AMTOR/SITOR. Also known as "B" mode. The automatic broadcast mode, no response is required from receiving station(s). See also ARQ mode.

FCC (Both)-- Federal Communications Commission. US regulatory agency for radio communications.

FM (Both)-- Frequency Modulation. A transmission mode of high clarity, normally used in the VHF range. Voice fluctuations cause changes in frequency.

FSK (Both)-- Frequency Shift Keying. Special transmission mode used in HF data transmissions. Two frequencies, a high/ low pair called mark and space, are used to transmit data. The tones are generated internally inside the radio. See also AFSK.

G

GATEWAY (ARS)—VHF to HF interconnection, or amateur packet to internet connection. Greatly extends the communications range for cruising amateurs.

GMDSS (MRS)—Global Maritime Distress And Safety System. Multi-faceted system designed to enhance safety at sea. Special channels set aside for each transmission mode and on each band for distress and safety traffic.

H

Ham (ARS)—A licensed amateur radio operator.

Health And Welfare (ARS)—Traffic on an MM net, a request for information on a certain vessel or crew to determine the health and welfare status of a vessel or crew.

HF (Both)—High Frequency. Long range frequency band(s) used by both ARS & MRS. 3 MHz to 30 MHz.

I
J
K
L

LSB (Both)—Lower Side-band. One mode used in SSB transmissions. The upper side-band and the carrier are suppressed. LSB is not used in MRS voice communications; however, SITOP is usually received in LSB mode. LSB is the "standard" voice mode used in amateur radio, below 10 MHz.

M

MAYDAY (Both)—International voice "Distress Signal", used only in cases involving grave and imminent danger to life or property and where immediate assistance is required. Mayday is spoken three times in a row prior to the distress message. (CFR 47 Part 80). See Mayday format in Appendix 4.

MCI (MRS)—MCI Incorporated. A commercial corporation providing MRS public coast station services.

MF (MRS)—Medium Frequency. Medium range frequency band. 2 MHz to 3 MHz.

MIN (MRS)—Marine Identification Number. Registration (billing) number used with the marine or high seas operator.

MMRI (MRS)—Mobile Marine Radio Inc. Commercial corporation providing public coast station service from Mobile, AL (station WLO).

MSI (MRS)—Maritime Mobile Service Identity. Identification number used in Digital Selective Calling (DSC) applications. A ship's unique radio ID, assigned by the FCC on the Ship Station License application form.

Modem (MRS)—Modulator-demodulator. The device that allows HF digital mode operation. Used with a radio and computer to provide long range digital communications. See also TNC.

MSI (MRS)—Marine Safety Information. Special navigation and safety information broadcast to mariners on designated frequencies. See HF Frequency Appendix (# 12).

N

NAVTEX (MRS)—Marine weather and safety broadcasts on special NBDP frequencies. A special demodulator printer is required.

NBDP (MRS)—Narrow Band Direct Printing. A generic term used to describe Radio Teletype (RTTY) or other digital type transmissions used for message type data. See HF Frequency Appendix (# 12).

Net (ARS)—A group of amateurs who have agreed to meet, at a certain time, on a certain frequency, for a specific purpose.

O
P

Packet Radio (ARS)—A digital, high speed mode of transmission, used to transfer data between stations.

FACTOR (Both)—An HF digital mode of communication. Good error correction scheme, passes both text and computer file information.

PAN-PAN (Both)—Spoken as "pahn-pahn". The international voice "Urgency Signal". The Urgency signal is used only to indicate a very urgent message

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concerning the safety of a ship or other vehicle, or of some person on board or in sight. PAN-PAN is Spoken three times in a row prior to the urgent message. (CFR 47 Part 80).

Phone Patch (ARS)-- A device used to interconnect HF radio equipment to phone lines, allowing distant ham stations to talk to family and friends via telephone lines.

PL (ARS)-- "Private Line (TM)". A proprietary name, now used generically to describe sub-audible tone access on FM repeater systems. A sub-audible tone must be transmitted concurrently with your transmit signal to gain access to "PL'd" repeater systems e.g. 100 Hz.

Portable Transmitter (MRS)-- A special license category for portable transceivers carried between ships. Used when a radio is frequently used aboard several different vessels. See also ASU.

Private Coast Station (MRS)-- A business licensed to operate radio equipment on the marine bands to conduct private business with vessels e.g. A fuel dock.

Public Coast Station (MRS)-- a station licensed to provide common carrier services (telephone, telex, etc.) for vessels. E.G. High seas telephone operator.

Q R

Radial (Both)-- A 1/4 wavelength tuned wire used with an antenna system to create a counterpoise or artificial RF ground.

RCC (Both)-- Rescue Coordination Center. US Coast Guard (and others internationally) communications centers responsible for coordination of rescues at sea. See RCC List in Appendix (# 9).

Reciprocal License (ARS)-- A license issued by one country to an amateur from another country. Only issued between countries with formal written agreements. See Reciprocal License Appendix (# 9).

Recreational Vessel (MRS)-- A pleasure craft not used for commercial purposes. Therefore a "voluntary" equipped vessel not required to be equipped with radio equipment. Uses "recreational" vessel, non-commercial, working channels on VHF. See VHF Frequency Appendix (# 11). Ref. CFR 47, Part 80.

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Repeater (ARS)-- A device which receives signals (typically FM) and re-transmits them over a wide geographical area. Used on 10, 6, 2, 1.25 meter, 70, and 23 cm bands.

RTTY (Both)-- Radio Teletype. A mode of transmission used to transmit text type messages. (Also called TOR in MRS). Uses FSK or AFSK emission types.

S

SAR (Both)-- Search And Rescue. Special activity to locate and save distressed vessels at sea.

SECURITE' (MRS)-- Spoken as "Say-Cur-I-Tay". International voice "Safety Signal" used to identify a message concerning the safety of navigation or giving important meteorological warnings. Securite' is spoken three times in a row prior to the safety message. See CFR 47, Part 80.

SelCall (Both)-- Selective Calling. A unique digital ID used in SITOR and ham AMTOR applications for automated station calling to alert vessels or coast stations that traffic is waiting.

Simplex (Both)-- One-way-at-a-time communication. In radio usage, single frequency (channel) communication. See also Duplex.

SITOR (MRS)-- Simplex Telex Over Radio. An RTTY communications mode used to pass message type traffic; may be run in interactive (ARQ) or broadcast (FEC) mode. Uses special error correction techniques.

SOS-- International Morse Code (CW) Distress Signal. Same as Mayday for voice. See Mayday above.

SSB (Both)-- Single Side-band. A voice modulation mode normally used on HF radio. It provides improved spectrum use (narrower signal bandwidth) compared to AM. Either USB or LSB (ARS only) may be used.

T

Third Party Traffic (ARS)-- Message or phone patch traffic passed to or from amateurs for another "third party". Between US and foreign hams, a formal agreement must have been reached by the respective countries.

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TNC (ARS)-- Terminal Node Controller. A modulator/ demodulator device used to transmit/ receive Packet radio. Multi-mode TNCs also copy other transmission modes like AMTOR, WX FAX, CW, SITOR, NAVTEX, RTTY, Clover, and FACTOR.

TOR (MRS)-- Telex Over Radio. A message mode of transmission used between ships and shore. (Called RTTY in ARS). See ATOR.

TVI (both)--Television interference. Interference to TVs caused by transmitting equipment.. Reduced by a low pass filter.

U

UHF (ARS)-- Ultra High Frequency. The band of frequencies above VHF. 300 to 3000 MHz. E.G. 450 MHz/ 70 CM Ham Band.

USB (Both)-- Upper Side-band. One mode of SSB transmission. The carrier and LSB are suppressed. Normal mode for MRS voice transmissions.

UTC (both)--Universal Time Constant. World time based upon a 24 hour clock, all related back to the time of day at Greenwich, England. Provides a common reference point for the entire globe. Also called "zulu" or GMT.

V

VE (ARS)-- Volunteer Examiner. A licensed amateur (General Class and above, as of July 1) who agrees to give Amateur Radio exams. As of July 1, 1993, all VEs must be registered and work with a VEC group to give amateur radio exams.

VEC (ARS)-- Volunteer Examiner Coordinator. An organization, registered with and approved by the FCC, to coordinate VEs administering amateur radio examinations.

VFO (ARS)-- Variable Frequency Oscillator. The frequency determining unit of a transmitter/ receiver. It provides continuous frequency coverage over it's operating range (vs. "frequency steps" in MRS frequency determining units).

VHF (Both)-- Very High Frequency. The range of frequencies from 30 to 300 MHz. Short range, line of sight bands.

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W

WARC (Both)-- World Administrative Radio Conference. Special meetings held by the ITU to determine international radio spectrum usage. E.G.--New frequencies determined for Marine SSB channels effective July 91, new ham bands authorized on 10, 18, and 24 MHz. by WARC-79.

WX (Both)-- Weather.

X

Y

Z



APPENDIX 2. IMPORTANT ADDRESSES/PHONE NUMBERS

In Alphabetical Order

1. MARINE, AMATEUR, AND OTHER AGENCIES

Agency

American Boat Yacht Council (ABYC)
PO Box 747
Millersville, MD 21108

American Radio Relay League, Inc.
225 Main St.
Newington, CT 06111
Ph: (203) 666-1541
(800) 326-3942
Email: EAD@ARRL.ORG
Web Site: <http://www.arrl>

Electronics Industries Assoc. (EIA)
2001 Eye St. NW
Washington, DC 20006
Ph: (202) 457-4922

FMS Consulting Services
2539 S. Fairplay Way
Aurora, CO 80014-2522
Ph/ fax: (303) 695-8715
EMAIL: rogerk0yy@aol.com

Int. Assoc. Medical Advice
For Travelers (IAMAT)
Lewiston, NY 14092
Ph: (716) 754-4883

National Elec. Mfrs. Assoc. (NEMA)
2101 L St. NW
Washington DC 20037

Information/ Topic

Boat Technical
and Installation
Standards

Amateur Radio,
Training, VEC,
Membership info.,
Bookstore

Technical/ RFI
Information

Consulting Services for
marine, amateur, satellite,
equipment and services
selection
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Medical Advice/
Location of English
Speaking Doctors

Technical Standards

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National Hurricane Center
1320 South Dixie Highway
Coral Gables, FL 33146
(305) 536-4460

Tropical Storm-
Hurricane Info./
WX FAX Info.

National Ocean And Atmospheric
Administration (NOAA)
National Weather Service (NWS)
SSMC2, ATTN: W/OM11
1325 East-West Highway
Silver Spring, MD 20910

NOAA Information/
List Of Weather
Stations

National Weather Service
Attn: Marine
WWBG, Room 410
5200 Auth Road
Washington, DC 20233
Ph: (301) 763-8441

WX FAX Operations/
Questions

Radio Technical Commission For
Maritime Services
1800 Diagonal Road, suite 600
Alexandria, VA 22314
Ph: (703) 684-4481
fax: (703) 836-4229

Maritime Radio
Users Handbook

Seven Seas Cruising Association, Inc.
1525 South Andrews # 217
Fort Lauderdale, FL 33316
Ph: (954) 463-2431
fax: (954) 463-7183
Web site: <http://www.sscaassn@aol.com>

Cruising Information/
Membership

W5YI VEC Group
PO Box 565101
Dallas, TX 75356
Ph: (817) 461-6443

Volunteer Examiner
Coordinator Group

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2. MARITIME SERVICE PROVIDERS

a. Offices

Addresses

AT&T High Seas Radio Telephone Services

101 JFK Parkway
Short Hills, NJ 07059

(800) SEA-CALL

Email: highseas@attmail.com

COMSAT Maritime Services

950 L'Enfant Plaza SW
Washington, DC 20024
(800) 424-9152

CP Communications International

1100 Park Central S # 1800
Pompano Beach, FL 33064
(800) 566-2724

Globe Wireless

1 Meyn Road
Half Moon Bay, CA 94019
(800) 624-4542
Email: Yachts@globewireless.com

Maritime Cellular Network

6650 W. Indiantown Rd # 120
Jupiter, FL 33458
(800) 848-9660
Email: mcnwpt@aol.com

Message Center, Inc.

Pensacola, FL
(334) 952-0299, Fax: 943-3025
Email: msgctr@world.std.com

Quest Telecomm. International

89 Main St # 1
Ellsworth, ME 04605
(207) 664-0122
Email: quest@hypernet.com

Services Provided:

SSB Voice

Maritime Satellite

Maritime Satellite

Digital Messaging
Email, SITOR--
World-wide network

Cellular Phone

Voice and Email
Messaging, SITOR

Maritime Satellite
Consulting Services

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Digital messages and
Email

Pineoak Digital

PO Box 360
Gladstone, NJ 07934
908)234-2020
Email: info@pineoak.com

b. Private/ Public Coast Stations

(Shore To Ship Calls/ SITOR or EMAIL messages--Inquires)(Major Stations)

Station

KLB Arlington, WA (SMRI)

KMI Inverness, CA (AT&T)

KPH San Francisco, CA (Globe)

KFS Half Moon Bay, CA (Globe)

Pinoak Gladstone, NJ (Pineoak Digital)

WLC Rogers City, MI (Globe)

WLO Mobile, AL (MMRI)

WNU Slidell, LA (Globe)

WOM Ft Lauderdale, FL (AT&T)

WOO Manahawkin, NJ (AT&T)

WCC Chatham, MA (Globe)

WAH St. Thomas, VI (GCC)

VCT Nova Scotia (Globe)

8P6 Barbados (Globe)

Phone Number

(800) 477-7552

(415) 669-1055 (Collect)

(800) 456-2291

(415) 726-6588 (Main Office)

(800) PIN OAK1, Fax (908) 234 9685

(800) 633-1312

(305) 587-0910 (Collect)

(609) 597-2201 (Collect)

(800) 456-2292

(800) LEE-WARD

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3. FEDERAL COMMUNICATIONS COMMISSION(FCC)

FCC	<u>Information</u>
Private Wireless Telecomm. Bureau	Licensing Questions
Licensing Division or	Consumer Assistance
Consumer Assistance Branch	
1270 Fairfield Rd.	
Gettysburg, PA 17325-7245	
Ph: (717) 338-2500	
(800) 322-1117	
National Call Center: (888) 225-5322	
Email: mayday@fcc.gov	
Web Site: http://www.fcc.gov/wtb/wirehome.html	

FCC	Amateur Radio Service
Amateur Radio Service	Applications- Form 610
1270 Fairfield Rd.	
Gettysburg, PA 17325-7245	

FCC	Marine Ship Service/
Marine Ship Service	Applications-
PO Box 358275	Form 506
Pittsburgh, PA 15251-5275	

FCC	Operator Permit
Restricted Radio Telephone Permit	Applications-Form 753
PO Box 358295	
Pittsburgh, PA 15251-5295	

FCC	Forms Orders
Forms Distribution Center	
2803 52nd Ave.	
Hyattsville, MD 20781	
Ph: (202) 418-3676	
(800) 418-form	

Fax-on-demand forms: (202) 418-0177	Forms via Fax
-------------------------------------	---------------

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4. US COAST GUARD.

a. Addresses and Phone numbers

US Coast Guard Commandant	Headquarters
2100 2 nd St. SW	
Washington, DC 20593	
(202)267-2229	
Web Site: http://www.dot.gov/dotinfo/uscg/	

US Coast Guard Navigation Center	Navigation,
7323 Telegraph Road	Marine Communications
Alexandria, VA 22310	
(703) 313-5800	
Web Site: http://www.navcen.uscg.mil	
Comm. Web Site: http://www.navcen.uscg.mil/marcomms/marcomms.html	
<u>Master Comm. Station Update Web site:</u>	
http://www.crl.com/~gardiner/campac/marinehome.html	

B. US Coast Guard Communication Stations (Communications inquiries, WX broadcast inquiries)

NMO Honolulu, HI	(808)628-4430
------------------	---------------

NMC Point Reyes, CA	(415) 669-2047
---------------------	----------------

NMN Portsmouth, VA	(757) 421-6240
--------------------	----------------

c. USCG Global Positioning System (GPS) Information Center.

GPS System Information	(703) 310-5900
------------------------	----------------

d. US Coast Guard Local Notice To Mariners Center.

Electronic Bulletin Board System	(703) 313-5910
(User ID available over the phone)	

E. US Coast Guard Marine Safety Center

Phone	(202)366-6484
Information Hot Line	(800) 368-5647

Note: See also The Rescue Coordination Center Appendix (# 5) for their phone numbers.

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APPENDIX 3. COMMENT/ CORRECTION FORM

(Copy, fill in and mail)

Date: _____

To: FMS Services
2539 S. Fairplay Way
Aurora, CO 80014-2522
Voice mail/ fax-303-695-8715
Email- rogerk0yy@aol.com

Roger, K0YY,

CORRECTIONS:

Roger, there's an error in your CRG. Please correct it.

Reference:

Page # _____ Paragraph # _____ Line # _____

It says:

It should say:

COMMENTS:

Roger, here's an update to your information, or here's a better way to say what you said:

Reference:

Page # _____ Paragraph # _____ Line # _____

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REMARKS:

Roger, here's some great information you ought to put into the CRG, or I need more space from above:

Regards,

Name: _____

Ham/ marine call: _____

Boat Name: _____

Address: _____

Phone Number: _____

APPENDIX 4. EMERGENCY DATA FORM

Copy 1 (keep in back of book)

FOR USE WITH RADIO DISTRESS CALLS

(Fill out as much as possible ahead of time.)

1. Select Channel 16 VHF, 2182 kHz MF, or other appropriate emergency frequency (4125 kHz, or Ham Net).

2. Speak- SLOWLY and CLEARLY.

3. Say- "MAYDAY-MAYDAY-MAYDAY",

"THIS IS- _____, _____, _____,
(boat name) (boat name) (boat name),"

(callsign)

"MY LOCATION IS-(distance/ bearing from landmark):

OR (latitude/ longitude):

4. Describe emergency: _____

5. State assistance requested:

6. State number of persons on board (POB) and extent of any injuries:

7. Describe your vessel:

Boat Length _____ Hull Color _____

Trim Color _____ Doc./ Reg. # _____

Type(Trawler/ Sportfisher/ Sail- Ketch/ etc.) _____

Other distinguishing characteristics _____

8. State the frequency you will monitor (16/ 2182/ net) _____

9. End by saying: "THIS IS (Boat name) _____ OVER".

10. If no answer, repeat message. If still no answer, switch to another channel/ frequency and begin again.

11. Additional Information (list ahead of time):

a. List all survival gear on board:

b. List all navigation gear on board:

APPENDIX 4. EMERGENCY DATA FORM

Copy 2 (Cut out and post by radio)

FOR USE WITH RADIO DISTRESS CALLS

(Fill out as much as possible ahead of time.)

1. Select Channel 16 VHF, 2182 kHz MF, or other appropriate emergency frequency (4125 kHz, or Ham Net).

2. Speak- SLOWLY and CLEARLY.

3. Say- "MAYDAY-MAYDAY-MAYDAY",

"THIS IS- _____, _____, _____,
(boat name) (boat name) (boat name)

(call sign)

"MY LOCATION IS-(distance/ bearing from landmark)

_____ "

OR (latitude/longitude)

4. Describe emergency: _____

5. State assistance requested:

6. State number of persons on board (POB) and extent of any injuries:

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7. Describe your vessel:

Boat Length _____ Hull Color _____

Trim Color _____ Doc./ Reg. # _____

Type(Trawler/ Sportfisher/ Sail- Ketch/ etc.)

Other distinguishing characteristics:

8. State the frequency you will monitor (16/ 2182/ net)

9. End by saying: "THIS IS (Boat name/ call sign) _____ OVER".

10. If no answer, repeat message. If still no answer, switch to another channel/ frequency and begin again.

11. Additional Information (list ahead of time):

a. List all survival gear on board:

b. List all navigation equipment on board:

APPENDIX 5.-US/ CANADIAN RESCUE COORDINATION CENTERS (RCCS)

In Location Order

(Special thanks to Wally WA6ITE, Flotilla Commander, Flotilla 15-04, USCGA, for updates to this list.)

Distress and Urgency (Emergency) traffic may be directed to these RCCs. Amateurs or mariners relaying such information may do so using the phone numbers below. Contact the center closest to you (to relay the emergency message) or the center closest to the emergency.

<u>RCC Agency/ Location</u>	<u>Phone Number</u>
US Air Force Okinawa	611 7342605, (Ext. 42605) (International prefix- 011 Country Code 81- then above number)
US Coast Guard Honolulu, HI	(808) 541-2500
US Coast Guard Kodiak, AK	(907) 487-5888
US Coast Guard Juneau, AK	(907) 463-2000
Canadian Coast Guard Victoria, BC	(250) 380-2333
US Coast Guard Alameda, CA	(510) 437-3700
US Air Force Howard AFB Panama	011 507 284 3545 011 507 284 4800
US Coast Guard New Orleans, LA	(504) 589-6225

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US Coast Guard San Juan, PR	(809) 729-6817
US Coast Guard Miami, FL	(305) 536-5611
US Coast Guard New York, NY	(617) 223-8555

Canadian Coast Guard Halifax, NS	(902) 427-8200
-------------------------------------	----------------

Selected International RCCs

International prefix--011, when calling from another country + Country code (given below--first two digits)

Australian Coastal Surveillance Center Canberra, Australia	61 6247 5244
New Zealand Rescue Coordination Center	64 4570 1000
China Maritime Search And Rescue Center Beijing, China	86 1 529 2221
Maritime Safety Tokyo, Japan	81 33591 6364/6365
Mexican Navy Southern Baja Area	52-068 225691
Mexican Navy Sea Of Cortez Area	52-678 20292
Mexican Navy Acapulco Area	52-748 45471
Maritime Rescue Coordination Center Valparaiso, Chile	56 225 8091

Rescue Authority
Of Brazil

55 21216 6056

Her Majesty's
Coast Guard
Falmouth, England

44 326 317575

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APPENDIX 6. TRANSMISSION MODES AND EMISSIONS

1. THE FOLLOWING TYPES OF EMISSIONS ARE AUTHORIZED FOR THE SERVICE(S) INDICATED.

ITU Emission

Designator	Mode (Emission Type)	Services
A1A	CW, Morse Code	Marine, Amateur
A3E	AM, Double-Sideband, Full Car.	Broadcast, Amtr.
F1B	RTTY, AMTOR, SITOR (FSK)	Marine, Amateur
F1D	Data (Packet Radio)	Amateur
F2B	RTTY, AMTOR, SITOR(AFSK)	Marine, Amateur
F3E	FM Phone, (VHF Transceivers)	Marine, Amateur
G3E	Phase Modulation (FM Phone)	Marine, Amateur
H3E	SSB, Full Car.(USB)	Marine
J3C	FAX, USB or LSB	Marine, WX FAX
J3E	USB, Suppressed Carrier	Marine, Amateur
J3E	LSB, Suppressed Carrier	Amateur

Note: There are a number of other emissions authorized in the marine and amateur services. These are the common ones used by recreational/ voluntary licensed marine vessels and ham MM operators.

2. ITU EMISSION DESIGNATOR DEFINITIONS (SELECTED TYPES):

Note: This is a limited presentation, designed to meet the needs of the cruising community.

a. First character- type of modulation of the main carrier.

A = Amplitude Modulation, Double Sideband, Full Carrier

F = Frequency Modulation

G = Phase Modulation (similar to FM)

H = Amplitude Modulation, Single Side-band, Full Carrier

J = Amplitude Modulation, Single Side-band,
Suppressed Carrier

b. Second Character- Nature of signal modulating main carrier.

1 = Single Channel, Digital Information

2 = Single Channel, Digital Information,
Modulating Subcarrier

3 = Single Channel, Analog Information

c. Third Character- Type of information.

A = Telegraphy, Aural (manual) reception (CW)

B = Telegraphy, Automatic Reception

C = Facsimile (FAX)

D = Data (Packet Radio)

E = Telephony (voice)

Manual

APPENDIX 7. ITU PHONETIC ALPHABET

<u>LETTER</u>	<u>IDENTIFYING WORD</u>	<u>SPOKEN AS *</u>
A	Alpha	AL FAH
B	Bravo	BRAH VOH
C	Charlie	CHAR LEE
D	Delta	DELL TAH
E	Echo	ECK OH
F	Foxtrot	FOKS TROT
G	Golf	GOLF
H	Hotel	HOH TELL
I	India	IN DEE AH
J	Juliett	JEW LEE ETT
K	Kilo	KEY LOH
L	Lima	LEE MAH
M	Mike	MIKE
N	November	NO VEM BER
O	Oscar	OSS CAH
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIR RAH
T	Tango	TANG GO
U	Uniform	YOU NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEY
Z	Zulu	ZOO LOO

* Note: Bold syllables are emphasized when spoken.

APPENDIX 8. MM NET OPERATIONS SPECIAL TERMS

(Amateur Radio Service)

The following terms have special meanings when used on MM Nets. They are used to quickly identify needed actions, limit unnecessary repetition, and notify net participants when certain traffic is appropriate (E.G. "Check-ins with traffic, come now!") Not all nets use all terms.

Remember, there are many people listening who need the services of the net. Please, think through your transmission before keying the microphone. See the section on Net Operations Procedures.

Break Break-- An Emergency call, immediate assistance is required for a situation involving imminent danger to property or life.

Base Station-- Land based, strong signal station who may offer phone patch or message services, or act as a relay station.

Check-In With-- You have traffic: a call for another station, want a phone patch, etc. Specify which, when authorized to go ahead by the NCS or a relay station.

Check-In Without-- You have no traffic but are listening on frequency and are available.

Check-Out-- A checked in station must leave the net, and will no longer be available for calls; especially important if you have listed traffic.

Contact-- You wish to talk with the station currently in contact with the NCS. A shortcut method to get to a station before they leave. Don't abuse it.

Info.-- You have information directly pertaining to a question just asked on the net.

List-- You have called a station but were unable to make contact and wish to have your traffic recalled later (be "listed" for recall).

Local-- You desire to have a phone patch run from only the immediate local area of your called party (no long distance charge).

Long Haul-- You will accept a phone patch from a considerable distance away from your called party (a long distance collect call is OK to your party).

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Net Control Station-- The station running a net, responsible for maintaining orderly operation of the net.

One Way-- You desire to pass a message to someone ashore and a telephone call from a base station to your called party is OK. No direct contact is necessary with your party.

Phone Patch-- A matching device that connects radio equipment to telephone circuits; or a MM station desires telephone contact with a party on shore. (See also Two Way.)

QST-- A general call indicating a transmission of information of interest to all listening. Also The ARRL monthly magazine.

Query-- A station has a question for the net.

Re-check-- You made contact with a station and went off net frequency, however you were unable to find each other and have come back to net frequency to hook up again.

Re-Entry With-- You went off frequency with a station and completed your traffic; however, you are returning "with" additional traffic for the net.

Re-Entry Without-- You went off frequency with a station and completed all traffic. You are announcing your return "without" additional traffic for the net.

Relay-- You hear a station the NCS or calling station cannot, and you can relay information to or from both of them.

Relay Station-- A designated station used by the net control station to pick up stations he or she may not hear because of propagation limitations or interference.

Short Haul-- You have phone patch traffic and wish to only have the patch run from close to your calling party (limit collect charges to your party).

Short Time-- You must leave the net shortly and wish to make a final call for listed traffic before departing. Do not abuse.

Two Way-- You desire or can provide phone patch service.

CRG Part Va, General Information Appendices.

Notes:

1. Not all nets use all terms; listen to see which are appropriate.
2. Net protocol and formats vary; listen first.
3. See additional notes in the MM Net List Appendix.



APPENDIX 9. RECIPROCAL LICENSE COUNTRIES

(Amateur Radio Service, As of 1997)

In Country Order.

<u>Country</u>	<u>Call Prefix</u>
Antigua/ Barbuda	V2
Argentina	LU
Australia	VK
Austria	OE
Bahamas, The	C6
Barbados	8P
Belgium	ON
Belize	V3
Bolivia	CP
Bosnia-Herzegovina	T9
Botswana	A2
Brazil	PY
Canada	VE
Chile	CE
Columbia	HK
Costa Rica	TI
Croatia	9A
Cyprus	5B
Denmark	OZ
Dominica	J7
Dominican Republic	HI
Ecuador	HC
El Salvador	YS
Federated States of Micronesia, V6	
Fiji	3D2
Finland	OH
France/Dependencies	F
Germany	DL
Greece	SV
Grenada	J3
Guatemala	TG
Guyana	8R
Haiti	HH
Honduras	HR

CRG Part Va, General Information Appendices.

Hong Kong	VS
Iceland	TF
India	VU
Indonesia	YB
Ireland	EI
Israel	4X
Italy	I
Jamaica	6Y
Japan	JA
Jordan	JY
Kiribati	T3
Kuwait	9K
Liberia	EL
Luxembourg	LX
Macedonia	Z3
Marshall Islands	V7
Mexico	XE
Monaco	3A
Micronesia, FS	V6
Netherlands	PA
Netherlands Antilles	PJ
New Guinea	P29
New Zealand	ZL
Nicaragua	YN
Norway	LA
Panama	HP
Paraguay	ZP
Peru	OA
Philippines	DU
Portugal	CT
Seychelles	S79
Sierra Leone	9L
Solomon Islands	H44
South Africa	ZS
Spain	EA
St Lucia	J6
St Vincent/ The Grenadines	J8
Surinam	PZ
Sweden	SM
Switzerland	HB
Thailand	HS

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Trinidad/Tobago	9Y
Tuvalu	T2
United Kingdom/ Dependencies	G
Uruguay	CX
Venezuela	YV

Notes:

1. US hams may obtain a reciprocal license from the above governments upon application and submission of the proper forms. Forms may be obtained from foreign government communications agencies. The ARRL has most countries' forms on file and will provide copies to members and non-members on an occasional basis.
2. Hams from these reciprocating countries are also eligible for a US license using FCC Form 610-AL.
3. No formal paperwork is required for US hams to operate in Canada and visa versa. A "full" reciprocal agreement exists with Canada. US hams are limited to their US frequency privileges in Canada. Canadian "Advanced Amateur Class" hams are limited to US Amateur Extra frequencies while in the US. Canadian "Amateur Class" or lower class hams are limited to their home frequency privileges while in the US.
4. See the section on international operations in the Amateur Radio Chapter.

CRG Part Va, General Information Appendices.

APPENDIX 10. THIRD PARTY TRAFFIC COUNTRIES

Amateur Radio Service, As of 1997

In Country Order

Relayed messages, one way phone calls, and two way phone patches are only authorized to or from countries with formal written agreements. US amateurs may conduct Third Party Traffic to or from:

Country	Call Prefix	Country	Call Prefix
Antigua/ Barbuda	V2	Honduras	HR
Argentina	LU	Israel	4X
Australia	VK	ITU Geneva	4UIITU
Belize	V3	ITU-Vienna	4UIVIC
Bolivia	CP	Jamaica	6Y
Bosnia-Herzegovina	T9	Jordan	JY
Brazil	PY	Liberia	EL
		Marshall Islands	V7
Canada	VE	Mexico	XE
Chile	CE	Micronesia, FS	V6
Columbia	HK	Nicaragua	YN
Comoros, FIR	D6	Panama	HP
Costa Rica	TI	Paraguay	ZP
Cuba	CO	Peru	OA
Dominica	J7	Philippines	DU
Dominican Republic	HI	Pitcairn Island	VR6
Ecuador	HC	Sierra Leone	9L
El Salvador	YS	St Christopher/	V4
Gambia, The	C5	St Kitts/Nevis	V4
Grenada	J3	St Lucia	J6
Guatemala	TG	St Vincent/	J8
Guyana	8R	Swaziland	3D6
Ghana	9G	Trinidad/Tobago	9Y
Haiti	HH	Uruguay	CX
		Venezuela	YV

APPENDIX 11. VHF MARINE FREQUENCY LIST

Reference: CFR 47, Part 80, Maritime Services.

1. DESIGNATED CHANNEL USES (USA):

a. Calling and DISTRESS:

16,
09 Secondary Calling (Recreational Vessels Only).

b. Safety: 06.

c. Coast Guard Liaison:

22A.

d. Recreational Vessel Working Channels:

("Voluntary" License- Cruisers, Private Fishing Boats, Pleasure Boaters, etc.)

09, 68, 69, 71, 72 (ship to ship only), 78.

e. Marine Phone Operators:

24-28, 84-87.

f. Commercial Vessel Working Channels:

("Compulsory" License- Charter Boats, Fishing Boats
(Commercial), Freighters, Ferries, Passenger Liners, etc.)

07, 08, 10, 11 (non VTS areas), 19, 79, 80, 88.

g. Port Operations:

12 (Non VTS areas), 14 (non VTS), 20, 65, 66, 73, 74.

h. Vessel Traffic Service (VTS):

(Designated Ports Only)

11, 12, 14.

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i. Navigation (Vessel Bridge To Bridge)(Narrow Channels, etc.): (1 Watt Only)

13, 67 (Lower Mississippi VTS only).

j. Digital Selective Calling(DSC):

70.

See Part 80, paragraph 80.373(f) for additional legal details and limitations. See the Marine VHF Operations paragraph for further operational details.

2. MARINE CHANNELS LISTED BY FREQUENCY: (MHZ). (US and International)

- Notes: 1. "A" channel suffix means- US channel. E.G. "22A".
2. XXX= No transmit authorized.
3. Blank in "International" means- same as US.
4. Operation on "International" channels in the US is prohibited.
5. See Part 80, paragraph 80.373 (f) for details and special restrictions.

Channel	US TX	Int TX	US RX	Int RX	Type/ Function
	(A)		(A)		
01	156.050		156.050	160.650	New Orleans P/O
02	156.100		156.100	160.700	
03	156.150		156.150	160.750	
04	156.200		156.200	160.800	
05	156.250		156.250	160.850	N/O, Houston P/O
06	156.300		156.300		Safety, SAR
07	156.350		156.350	160.950	Comm. Working
08	156.400		156.400		Comm. Working
09	156.450		156.500		Rec.Wk/ Rec. Call.
10	156.500		156.500		Comm. Working
11	156.550		156.550		VTS or Comm. Wk.
12	156.600		156.600		VTS or Port Ops.
13	156.650		156.650		Bridge to Bridge
14	156.700		156.700		VTS or Port Ops.
15	XXX XXX		XXX XXX	156.750	
	Environmental				
16	156.800		156.800		DISTRESS, Calling
17	156.850		156.850		State, SAR Train.

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Channel	US TX	Int TX	US RX	Int RX	Type/ Function
18	156.900		156.900	161.900	Comm. Working
19	156.950		156.950	161.550	Comm. Working
20	157.000		157.000	161.600	Port Ops.
21	157.050		157.050	161.650	Government
22 (A)	157.100		157.100	161.700	C/ G Liason
23	157.150		157.150	161.750	Government
24	157.200		161.800	161.800	Marine Operator
25	157.250		161.850	161.850	Marine Operator
26	157.300		161.900	161.900	Marine Operator
27	157.350		161.950	161.950	Marine Operator
28	157.400		162.000	162.000	Marine Operator
60	XXX XXX		156.025	160.625	160.625
61	XXX XXX		156.075	160.675	160.675
62	XXX XXX		156.125	160.725	160.725
63	156.175	156.175	156.175	160.775	New Orleans VTS
64	XXX XXX		156.225	160.825	160.825
65	156.275		156.275	160.875	Port Ops.
66	156.325		156.325	160.925	Port Ops.
67	156.375		156.375		Nav.- Lower Miss.
68	156.425		156.425		Rec. Working
69	156.475		156.475		Rec. Working
70	156.525		156.525		Digital Calling DSC
71	156.575		156.575		Rec. Working
72	156.625		156.625		Rec. Intership
73	156.675		156.675		Port Ops.
74	156.725		156.725		Port Ops.
77	156.875		156.875		P/Ops, Pilots
78	156.925		156.925	161.525	Rec. Working
79	156.975		156.975	161.575	Comm. Working
80	157.025		157.025	161.625	Comm. Working
81	157.075		157.075	161.675	Government
82	157.125		157.125	161.725	Government
83	157.175		157.175	161.775	Government
84	157.225		161.825		Marine Oper.
85	157.275		161.875		Marine Oper.
86	157.325		161.925		Marine Oper.
87	157.375		161.975		Marine Oper.
88	157.425		157.425	162.025	Comm. Intership
WX1	162.550	NOAA WX			
WX2	162.400	NOAA WX			
WX3	162.475	NOAA WX			

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WX4	162.425	NOAA WX
WX5	162.450	NOAA WX
WX6	162.500	NOAA WX
WX7	162.525	NOAA WX
WX8	161.650	Canadian WX
WX9	161.775	Canadian WX

Note:

See paragraph 1 above for descriptions of types of services. See the VHF Operations paragraph in the Marine Chapter for additional details.



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APPENDIX 12A. MARITIME SERVICE HF FREQUENCIES

In Type-of-Service, Then Frequency Order

(All frequencies in kHz)

Notes:

1. See Appendix 12B for US Coast Guard frequencies.
 2. Frequencies are believed correct at time of publication. Check with the appropriate authority to confirm them. See the Address Appendix.
- 1. HIGH FREQUENCY VOICE/SSB CHANNELS: (USB/J3E).**
(Maritime ships use the "USB"/"J3E" {suppressed carrier} mode of transmission.)

a. DISTRESS, CALLING, AND SAFETY CHANNELS:

Medium Frequency (MF) Voice Channels (Simplex):

Ship Xmit	Coast Xmit	ITU CH#	Function	Agency(s)	Area Limits/ Remarks
2182	2182		International Distress/ Calling	All	All Areas
2003			Intership Safety	Ships At Sea	Great Lakes Only
2082.5			Intership Safety	Ships At Sea	All Areas
2142			Intership Safety	Ships At Sea	Pac Coast, So. of 42' N., Days Only
2203			Intership Safety	Ships At Sea	Gulf Of Mexico Only
2638			Intership Safety	Ships At Sea	All Areas
2670	2670		USCG Intership/ Mar. Safety Info.	Contacts with CG/ USCG (Call on 2182 first)	Liason
2738			Intership Safety	Ships At Sea	All, Except Great Lakes, Gulf Of Mex.
2830			Intership Safety	Ships At Sea	Gulf Of

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Mexico
Only

High Frequency Voice Channels (Simplex Calling):

3023	3023		Search and Rescue	Ships and Aircraft	On Scene
5680	5680		Search and Rescue	Ships and Aircraft	Same
4125	4125	450	Safety/ DISTRESS	Ships, Ship-to-Shore	Also SAR
6215	6215	650	Safety/ DISTRESS	Ships, Ship-to-Shore	
8291	8291	850	Safety/ DISTRESS	Ships, Ship-to-Shore	
12290	12290	1250	Safety/ DISTRESS	Ships, Ship-to-Shore	
16420	16420	1650	Safety/ DISTRESS	Ships, Ship-to-Shore	
18795	18795				
22060	22060				
25097	25097				

Note: The USCG does not normally guard (monitor) the above distress channels except 2182. See Appendix 12B for "guarded" channels.

b. SHIP-TO-SHIP/SHORE WORKING CHANNELS(Simplex):

Medium Frequency (MF) Voice Channels:

2065	2065		Working Channel	Ships, Ship /Shore Working	
2079	2079		Same	Same	Same
2096.5	2096.5		Same	Same	Same

High Frequency (HF) Voice Channels:

4146	451	Working Channel	Ship-to-Ship/ Shore Informal Ch. #: 4A
4149	452	Same as Above	Same as Above 4B
4417	453	Same	Same 4C
6224	651	Same	Same 6A
6227	652	Same	Same 6B
6230	653	Same	Same 6C
6516	654	Same	Same 6D
8294	851	Same	Same 8A
8297	852	Same	Same 8B
12353	1251	Same	Same 12A
12356	1252	Same	Same 12B
12359	1253	Same	Same 12C
12362		same	same

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Ship Xmit	Coast Xmit	ITU CH#	Function	Agency(s)	Remarks
12365			same	same	
16528		1651	Same	Same	16A
16531		1652	Same	Same	16B
16534		1653	Same	Same	16C
16537			same	same	
16540			same	same	
16543			same	same	
16546			same	same	
18825			same	same	
18828			same	same	
18831			same	same	
18834			same	same	
18837			same	same	
18840			same	same	18A
18843			same	same	18B
22159		2251	Same	Same	22A
22162		2252	Same	Same	22B
22165		2253	Same	Same	22C
22168		2254	Same	Same	22D
22171		2255	Same	Same	22E
22174			same	same	
22177			same	same	
25100			same	same	
25103			same	same	
25106			same	same	
25109			same	same	
25112			same	same	
25115			Same	Same	
25118			Same	Same	

c. US MF/HF PUBLIC COAST VOICE CHANNELS:

("High Seas" Telephone Service) (For information on calling Shore-To-Ship see the Marine Chapter & Address Appendix).

2031.5	2490	209	Public Coast Phone	Ship To Shore	WOM
2118	2514	221	Same	Same	WOM
2406	2450	242			KMI
2390	2566	245			WOM
2406	2442	247			WOM
2003	2506	248			KMI
4065	4357	401			KMI

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Ship Xmit	Coast Xmit	ITU CH#	Function	Agency(s)	Remarks
4071	4363	403			WOM
4077	4369	405			WLO
4092	4384	410			WOO
4095	4387	411			WOO
4098	4390	412			WOM
4104	4396	414			WLO
4110	4402	416			KMI, WOO
4113	4405	417			KMI, WOM
4119	4411	419			WLO
4128	4420	422			WOO
4131	4423	423			WOM
8198	8722	802			WOM
8204	8728	804			KMI
8207	8731	805			WOM
8216	8740	808			WOO
8219	8743	809			KMI
8222	8746	810			WOM
8225	8749	811			WOO
8234	8758	814			WOM
8237	8761	815			WOO
8258	8782	822			KMI
8264	8788	824			WLO
8267	8791	825			WOM
8270	8794	826			WOO
8279	8803	829			WLO
8282	8806	830			WLO
8285	8809	831			WOM
12230	13077	1201			KMI
12233	13080	1202			KMI
12236	13083	1203			KMI, WOO
12245	13092	1206			WOM
12251	13098	1208			WOM
12254	13101	1209			WOM
12257	13104	1210			WOO
12260	13107	1211			WOO
12263	13110	1212			WLO
12272	13119	1215			WOM
12296	13143	1223			WOM
12302	13149	1225			WLO
12305	13152	1226			WLO

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Ship Xmit	Coast Xmit	ITU CH#	Function	Agency(s)	Remarks
12311	13158	1228			WOO
12314	13161	1229			KMI
12317	13164	1230			WOM
16360	17242	1601			WOM
16363	17245	1602			KMI
16366	17248	1603			KMI
16372	17254	1605			WOO
16378	17260	1607			WLO
16384	17266	1609			WOM
16387	17269	1610			WOM
16390	17272	1611			WOM
16405	17287	1616			WOM
16417	17299	1620			WOO
16429	17311	1624			KMI
16435	17317	1626			WOO
16450	17332	1631			WOO
16453	17335	1632			WLO
16480	17362	1641			WLO
22000	22696	2201			WOO
22012	22708	2205			WLO
22027	22723	2210			WOO
22039	22735	2214			KMI
22042	22738	2215			WOM
22045	22741	2216			WOM
22063	22759	2222			WOM
22066	22762	2223			KMI
22078	22774	2227			WLO
22081	22777	2228			KMI
22090	22786	2231			WLO
22105	22801	2236			KMI, WOO
22108	22804	2237			WLO

Note: KMI- AT&T, Inverness, CA
WOM- AT&T, Ft. Lauderdale, FL
WOO- AT&T, Manahawkin, NJ
WLO- MMRI, Mobile, AL

d. ITU Duplex Channels.

Listing all of the HF Duplex channels is beyond the scope of this edition. Many commercial marine HF radios have them pre-programmed in memory.

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2. SELECTED NON-VOICE HIGH FREQUENCY DISTRESS & SAFETY CHANNELS: (SEE ALSO USCG FREQS.—12B)

Reception and transmission of these signals requires a special demodulator/modulator system. See the Advanced Services section in the Marine chapter.

a. *RTTY/SITOR* Distress And Safety Traffic:

2174.5	International Distress
4177.5	Safety
6268	Same
8357.5	
12520	
16695	

b. *Digital Selective Calling (DSC)* Distress And Safety Traffic:

2187.5	International Distress
4188	Safety
6282	Same
8375	
12563	
16750	
156.525	

(Marine VHF Channel 70)

(Listed for completeness)

3. PUBLIC COAST STATION TOR/SITOR/ATOR SERVICES

Many public coast stations offer TOR/ SITOR/ ATOR services around the world. Dozens of channels are set aside with each station having channels in several frequency bands to cover their service areas. Listing all of the channels here is beyond the scope of this edition. Contact individual companies for details. Addresses and phone numbers are given in the Address Appendix (# 2). Major North American TOR/ SITOR/ ATOR stations include:

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Call	Company	Location	SELCALL/ DSC ID
KLB	SMRI	Arlington, WA	1113
KMI	AT&T	Inverness, CA	00-366-0000
KPH	Globe	San Francisco, CA	1091
KFS	Globe	Half Moon Bay, CA	1094
WLO	MMRI	Mobile, AL	00-660-0003
WNU	Globe	Slidell, LA	1109
WOM	AT&T	Fort Lauderdale, FL	00-366-0001
WOO	AT&T	Manahawkin, NJ	00-366-0002
WCC	Globe	Chatham, MA	1092
WAH	GCC	St. Thomas, VI	
WLC	Globe	Rogers City, MI	
VCT	Globe	St Johns, New.	

See the Address Appendix (# 2) for addresses and phone numbers.

References/ Notes:

1. There are several limitations and special conditions placed upon certain usages. Consult CFR 47 Part 80 for specific details.
 2. Reference: CFR 47, Part 80, Paragraphs 80.355 through 80.373.
 3. Reference: AT&T High Seas Radiotelephone Service Brochure.
 4. Reference: Globe Wireless Frequency List.
- See the Weather Frequency Appendix (# 15) for HF weather broadcast frequencies.

Cruiser's Radio Guide, Part Vb, Frequency Data

APPENDIX 12B, US COAST GUARD FREQUENCIES

In Type of Service Order

Note: Information is believed correct, however some services and frequencies were being upgraded at the time of publication. Check with the appropriate Communication Station or their web site for current information (See Appendix 2). Coast Guard Communications Stations provide the services outlined below:

Call	Station	MMSI #	SELCALL#
NMA	Miami	003669997	none
NMC	San Francisco	003669990	1096
NMF	Boston	003669991	1095
NMG	New Orleans	003669998	none
NMN	Portsmouth	003669995	1097
NMO	Honolulu	003669993	1099
NOJ	Kodiak	003669899	1106
NRF	Guam		
NRV	Guam	003669994	1100

MMSI= Maritime Mobile Service Identity used for DSC

1. High Frequency VOICE Contact Frequencies (Duplex):

a "Listening Watch" is keep on these voice channels by the Station(s) indicated. Watches may not be 24 hours-a-day on all frequencies. (Contact and Long Range Liaison System)

Ship	Coast	ITU	
Xmit	Xmit	CH#	Stations
kHz	kHz		
4125	4125	450	NOJ
4134	4426	424	NMC, NMF, NMG, NMN
6200	6501	601	NMA, NMC, NMF, NMG, NMN, NOJ, NRV
8240	8764	816	NMC, NMF, NMG, NMN
12242	13089	1205	NMA, NMC, NMF, NMG, NMN, NRV
16432	17314	1625	NMA

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2. HF Digital Selective Calling (DSC) Contact Frequencies:

USCG DSC equipment maintains a "Listening Watch" on these DSC frequencies. Watches may not be 24 hours-a-day on all frequencies. See the Marine Chapter for a discussion of "assigned" vs "carrier" frequency.

Freq. (assigned) USCG Station

(assigned-subtract 1.7 kHz for carrier frequency)

2187.5	NMA, NMF, NMG, NMN
4207.5	NMA, NMF, NMG, NMN
6312	NMA, NMF, NMG, NMN
8414.5	NMA, NMF, NMG, NMN
12577	NMF, NMF, NMG, NMN
16804.5	NMA, NMF, NMG, NMN

3. HF Duplex SITOP/NBDP Contact Frequencies

Ship	Coast	ITU	
Xmit	Xmit	CH#	Stations
			(Assigned—subtract 1.7 kHz for carrier frequency)
4174	4212	404	NMN, NMO
4175.5	4213.5	407	NOJ
4178	4215.5	412	NMC
6264.5	6316	604	NMN, NMO
6266	6317.5	607	NOJ
6268.5	6319.5	612	NRV
6272.5	6323.5	620	NMC
8382	8422	812	NRV
8386	8426	820	NMC
8388	8428	824	NMN
8389.5	8429.5	827	NMO
12482.5	12585	1212	NRV
12486.5	12589	1220	NMO
12490	12592.5	1227	NMN
12497.5	12600	1242	NMC
16689	16812.5	1612	NRV
16693	16816.5	1620	NMC
16696.5	16819.5	1627	NMN, NMO
22290	22382	2212	NRV
22294	22386	2220	NMC
22297.5	22389.5	2227	NMN, NMO

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4. Marine Safety Information (MSI) Broadcast Frequencies.

(Coastal and Offshore WX, Hazard to Navigation Warnings, Marine Safety Advisories, Electronic Aids To Navigation Advisories).

Note: See Appendix 15 For scheduled USCG WX Voice/ SITOR/ FAX broadcast frequencies and times.

a. VOICE MSI Broadcast Frequencies

Coast	ITU	
Xmit	CH#	Stations
4426	424	NMC, NMN
6501	601	NMO, NMN, NOJ, NRF
8764	816	NMC, NMN, NMO
13089	1205	NMC, NMN, NMO, NRF
17314	1625	NMC, NMN

b. TELEX/SITOR MSI Broadcast Frequencies:

Note—frequency listed is “carrier” frequency (actual “dial” frequency). Subtract 1.7 kHz for “assigned” frequency, use USB mode. See the Marine Advanced Operations paragraphs for details.

Coast	ITU	
Xmit	CH#	Stations
6312.3		NMF
8414.8		NMC, NMF, NMO
12577.3		NMF, NMO, NRF, NRV
16804.8		NMF, NMC, NRF, NRV
22374.3		NMO, NRF, NRV

c. Facsimile (FAX) Broadcast Frequencies.

Note—frequency listed is “carrier” frequency (actual “dial” frequency). Add 1.9 MHz for “assigned” frequency. See the Marine Advanced Operations paragraph for details. See the WX Appendix (15) for additional information.

Station	Frequencies
NOJ	6501
NMC	4344.1, 8680.1, 12728.1, 17149.3, 22525.1
NMF	6312.3, 8414.8, 12577.3, 16804.8
NMG	4316, 8502, 12788
NOJ	2052.1, 4296.1, 8457.1

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d. NAVTEX Broadcast Locations and Times. (MF 518 kHz)

Station	ID	Times (UTC)
Guam	V	0100, 0500, 0900, 1300, 1700, 2100
Kodiak	J	0300, 0700, 1100, 1500, 1900, 2300
Honolulu	O	0040, 0440, 0840, 1240, 1640, 2040
Point Reyes, CA	C	0005, 0400, 0800, 1200, 1600, 2000
Ft Steven, OR	W	0130, 0530, 0930, 1330, 1730, 2130
Cambria, CA	Q	0045, 0445, 0845, 1245, 1645, 2045
New Orleans	G	0300, 0700, 1100, 1500, 1900, 2300
Miami	A	
San Juan, PR	N	0130, 0530, 0930, 1330, 1730, 2130
Chesapeake, VA	F	0045, 0445, 0845, 1245, 1645, 2045
Boston		



APPENDIX 13. INTERNATIONAL TIME STATIONS**In Location Order**

Time Stations are located around the world which provide time of day signals. These stations provide highly accurate time necessary for celestial navigation. Some are very accurate frequency standards as well. WWV and WWVH are examples.

Since the stations are scattered in different regions and transmit on several frequencies, they also provide a propagation checking capability. If you can hear a time signal on a particular frequency, you may be able to communicate with other cruisers or shore stations in that area on bands near the time signal. Remember, however, that some of these stations use very strong transmitters, so your 100 watt signal may not make it.

Most time stations use AM modulation; however, a number do use CW. Some also provide useful information. For example, WWV and WWVH provide weather, GPS, Omega, and geomagnetic data. See the Weather Broadcast Frequency Appendix (# 15) for details.

COUNTRY/REGION	STATION	FREQUENCIES (KHZ)
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Asia/Australia:

New Delhi, India	ATA	5000 (CW), 10000, 15000 (CW)
Tokyo, Japan	JJY	2500, 5000, 8000 (CW), 10000, 15000
Xian, China	BPM	10000, 15000
Lyndhurst, Australia Also reported--	VNG	4500, 7500, 12000 5000 (CW), 8636 (CW), 10000, 12984 (CW), 16000 (CW)

Pacific:

Kauai, Hawaii	WWVH	2500, 5000, 10000, 15000 (See WX Frequency Appendix (# 15) for details on transmission content)
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South America:

Guayaquil, Ecuador	HD210A	3810, 7600 (CW)
Buenos Aires, Arg.	LOL	5000, 10000, 15000
Caracas, Venezuela Also Reported-	YVTO	6100 5000

North America:

Fort Collins, CO 20000 (See WX Frequency Appendix (# 15) for details on transmission content)	WWV	2500, 5000, 10000, 15000,
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Ottawa, Ontario	CHU	3330, 7335, 14670
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Europe:

Podebrady, Czech. Liblice, Czech	OLB5 OMA	3170 2500
Nauen, Germany	Y3S	4525
Rome, Italy	IAM	5000
Turin, Italy	IBF	5000
Moscow, Russia	RWM	4996 (CW), 9996 (CW), 14996 (CW)
Tashkent, Uzbek	RCH	2500 (CW), 5000 (CW), 10000 (CW)
Irkutsk, Russia	RID	5004 (CW), 10004 (CW), 15004 (CW)

Africa:

Olinfantsfontein South Africa	ZUO	2500 (CW), 5000 (CW)
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Cruiser's Radio Guide, Part Vb, Frequency Data

APPENDIX 14. ENGLISH LANGUAGE SHORTWAVE BROADCAST FREQUENCIES

1. SHORTWAVE BROADCAST BANDS.

3200 - 3400 kHz
4750 - 4995
5005 - 5060
5950 - 6200
7100 - 7300 (ITU Regions 1 & 3)
9500 - 9900
11650 - 12050
13600 - 13800
15100 - 15600
17550 - 17900
21450 - 21850
25670 - 26100

2. SELECTED SHORTWAVE STATIONS: (AM MODE).

<u>Stations</u>	<u>Frequencies (kHz)</u>
Voice Of America	5995, 6035, 6125, 9455, 9590, 9775, 11500, 11580, 11680, 11705, 11760, 15115, 15205, 15120, 15410, 15600, 17070, 17670, 17705, 17800, 21460, 21485, 21600, 21840, 26040.
BBC (Caribbean Xmtrs.)	5975, 6005, 6175, 7325, 9590, 9600, 9640, 9740, 11940, 12095, 15070, 15260, 15280, 15400, 17000, 17760, 17820, 21470, 21715, 25650.
Radio Canada	5960, 9755, 11730, 11940, 15440, 17860, 21695.
Radio Australia	5075, 5995, 6060, 6080, 7240, 9500, 9580, 11720, 11910, 13605, 13945, 15160, 15240, 15365, 17715, 17750, 17795, 21525, 21740.
Radio New Zealand	9700, 11960, 15485, 17770.

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HCJB, Quito, Ecuador	6095, 9745, 11740, 15155, 17825, 21455, 26020.
WCSM, Amer. Public Radio	5850, 9455, 9465, 9530, 9850, 13760, 15610, 15665, 17555, 21640.
Radio Germany (Caribbean Xmtrs.)	6040, 6045, 6055, 6085, 6120, 9515, 9535, 9545, 9565, 9610, 9640, 9700, 9705, 9770, 11865.
Radio Holland	9590, 11720, 15560
Swiss Radio	9885, 12035, 21630.
Radio Havana	11580, 11760, 11950, 13700, 15140.
Radio Moscow	6045, 7155, 9755, 11980, 12050, 15425, 15580, 15595, 17605, 17720, 21470.
Radio Japan	5960, 9505, 9595, 11635, 15325, 21610.

Notes:

1. Different frequencies, transmitter power, and antenna arrays are used by stations to beam specific regions at specific times of the day. For a given station, you may only hear a few of the frequencies listed at any one time.
2. You must search for the best reception for your area and time of day. Generally, use higher frequencies in the day and lower frequencies at night. Lower frequencies are normally better for "close" reception and higher frequencies for "far" reception.
3. On general coverage receivers (most newer ham transceivers), the AM mode and "wide" filter position must be selected for best AM broadcast reception. The A3E/ AM position must be selected on marine SSB receivers.
4. You will find a few broadcast stations outside the bands given above. Not all broadcasters follow the international band plan.

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APPENDIX 15. US/ CANADIAN/ CARIBBEAN WEATHER BROADCAST FREQUENCIES

Coast Stations In Location Order

NOTE: Frequencies and times change very often. Check with the station in question. See the Address Appendix for phone numbers and Web sites.

Location Station Times Frequencies (kHz): Coverage Areas
(UTC)

1. CG/HIGH SEAS VOICE WX BROADCASTS: (USB/ J3E MODE)

Guam (USCG)	NRV	0130	13089	Western Pacific Same
		0330	Same	
		0930	6501	
		1130	Same	
Honolulu (USCG)	NMO	0545	6501, 8764	North Pacific Same
		1145	Same	
		1745	8764, 13089	
		2345	Same	
Kodiak, AK (USCG)	NOJ	0230	6501	East. N Pacific
		1645	Same	
	WBH29	1300	4122	
		2200	Same	
Vancouver, BC (CCG)	VAI	0600	4384	North Pacific
		1800	Same	
San Francisco (USCG)	NMC	0430	4426, 8764, 13089	East-N Pacific
		1030	Same	
		1630	8764, 13089, 17314	
		2230	Same	
Oakland, CA (AT&T)	KMI	0000	4402, 13083	East. N Pacific
		1200	Same	

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Location	Station	Times	Frequencies (kHz):	Coverage Areas:
Mobile, AL (MMRI)	WLO	0600CST	4369, 8713, 13179	Gulf Coast, CAR
			17380, 22831	NOTE CST
		1200	Same	Same
		1800	Same	
		2400	Same	
St Thomas, VI (GCC)	WAH	0600AST	2506, 4357, 4381, 6510	CAR,
			8728, 13077	Note AST
		1400	Same	Same
		2200	Same	
Barbados	8PO	0050	4375, 8764	E CAR
		1250	Same	
		2050	Same	
Curacao, NA	PJC	1305	8722	S W CAR
		(UTC)		
Ft Lauderdale (AT&T)	WOM	1300	4363, 8722, 13092	Gulf, CAR, W-
			17242, 22738	N ATL
		2300	Same	Gulf, CAR, W-
				N ATL
Nassau Bahamas	C6N2	0100+OH		2522
		(Every odd hour on the hour)		
Bermuda	ZBM	1235	2582	Bermuda
		2035	2582	
Portsmouth, VA (USCG)	NMN	0400	4426, 6501, 8764	N ATL/ CAR/ Gulf Same
		0530	Same	
		1000	Same	
		1130	6501, 8764, 13089	
		1600	Same	
		1730	8764, 13089, 17314	
		2200	6501, 8764, 13089	
		2330	Same	
Manahawkin, NJ (AT&T)	WOO	1200	4387, 8749	Western N ATL Same
		2200	Same	

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Location	Station	Times	Frequencies (kHz):	Coverage Areas:
Halifax, NS (CCG)	VCS	0335	4408, 8785	North. N ATL
		0735	4408	Same
		1535	4408, 8785, 13113	
		2135	Same	
Rogers City, MI	WLC	1117	2514, 4369	Great Lakes
		1717	Same	
		2317	Same	

2. NATIONAL INSTITUTE OF STANDARDS

TIME STATION WX BROADCASTS: (AM MODE/ A3E)

Fort Collins, CO	WWV	Hourly	2500, 5000, 10000, (Male voice)	
(IDs 52 sec. past minute)			15000	
			20000	
		8 minutes past each hour		West. N ATL
		9 minutes past each hour		W-N ATL, CAR
		10 minutes past each hour.		East. N PAC
		14 & 15 min. past hour		GPS Status
		16 minutes past hour		OMEGA Status
		18 minutes past hour		Propagation Info
Hawaii	WWVH	Hourly	2500, 5000, 10000, 15000 (Female voice)	
(IDs 45 sec. past minute)		43 & 44 min. past each hour		GPS Status
		45 minutes past each hour		Propagation Info
		47 minutes past each hour		Omega Status
		48 minutes past each hour		West. N PAC
		49 minutes past each hour		East. N PAC
		50 minutes past each hour.		S PAC

3. NATIONAL HURRICANE CENTER: (USB)

Miami, FL (NHC)	KJY74	A/R	5562, 5696, 6673, 8876, Tropical Storm 9020, 10015, 11398, 13267 & Hurr. Track 13354, 17901, 21937 W ATL, CAR, E PAC
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4. SELECTED MORSE CODE WX BROADCASTS: (CW/ A1A)

Location	Station	Times	Frequencies (kHz):	Coverage Areas
		(UTC)		
San Francisco (MCI)	KPH	0500	426/500, 4247, 6477.5, 8618, 8642, 12808.5, 13002, 17016.8 17088, 22477.5, 22557	Pacific
		1900	Same	
Palo Alto, CA (Globe)	KFS	0330	8558.4, 12844.5, 17026, 22581.5	West Pacific
		0450	same	Storm/ Gale
		1050	same	Warnings
		1650	same	North Pacific
Mobile, AL (MMRI)	WLO (MMRI)	2250	same	Same
		0000	2055.5, 4343, 6416, 8514 N ATL, Trop 12886.5, 17022.5, 22487, WX Disturb. 26135, (Also 434 kHz)	
			(Every six hours: 0000, 0600, 1200, 1800,)	
		0100	Same	N PAC, Trop WX
			(Every six hours: 0100, 0700, 1300, 1900)	Disturb
		0300	Same	Western N ATL,
			(Every six hours: 0300, 0900, 1500, 2100)	
Chatham, MA (MCI)	WCC	0400	Same	Gulf Of Mex.
			(Every six hours: 0400, 1000, 1600, 2200)	
		0500	Same	CAR, SWN ATL
			(Every six hours: 0500, 1100, 1700, 2300)	
		1250	436/500, 4331, 6376, 8586, ATL, Gulf, 8630, 12847. 12925.5, CAR 13033.5, 16933.2, 1697 2, 22518	
		1650	Same	

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5. SELECTED SITOR WX BROADCASTS: (USB, SITOR B/ FEC MODE).
 (+1,700 Hz offset from carrier frequency listed below, narrow (cw) filter, USB mode, 170 Hz shift. Special demodulator required). (Note: The marine standard for SITOR is USB with plus 1700 kHz offset-different from amateur AMTOR)
Location Station Times Frequencies (kHz): Coverage Areas:

Honolulu (USCG)	NMO	0130	8427.5	Pacific Same
		0430	Same	
		0730	Same	
		1330	Same	
		2030	Same	
Vancouver, BC (CCG)	VAI	0200	4214.5, 8428.5	Eastern N PAC
		0700	Same	
San Francisco (USCG)	NMC	0000	6323.5, 8426	Pacific
		1800	Same	
San Francisco (Globe)	KPH	0500	4216, 6320, 6324.5, 8422.5, Pacific(ATOR)	
			8427, 12585.5, 12590, 12600,	
			16813, 16817.5, 22382.5	
		1900	Same	Same
Oakland, CA 8087 (AT&T)	KMI Pacific	0120+OH	4217.5, 6326.5,	
			8431.5, 12630, 16870,	
			19689.5, 22424.5	
			(20 minutes past odd hours).	
Palo Alto, CA (Globe)	KFS	0455	4363, 6507, 8725, 13083	Wide area
		1055	Same	
		1655		
		2255		
Slidell, LA (Globe)	WNU	0000	8416.5	Gulf, C/A
Mobile, AL (MMRI)	WLO	HURRICANE SEASON, June through November		
		0035	4462.5, 6344, 8534, 12992, N ATL,	
			16997.6 22688, 26144 Tropical WX	
			(Every six hours: 0035, 0635, 1235, 1835)	
		0135	SAME FREQ N PAC, -Trop.	
			(Every six hours: 0135, 0735, 1335, 1935) WX	

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0335 SAME FREQ Western N ATL
 (Every six hours: 0335, 0935, 1535, 2135)
 0435 SAME FREQ Gulf Of Mexico
 (Every six hours: 0435, 1035, 1635, 2235)
 0535 SAME FREQ CAR, SWN ATL
 (Every six hours: 0535, 1135, 1735, 2335)

(Note: SITOR is on a separate frequency from CW during Hurricane season)

NON HURRICANE SEASON, December through May

0035 4343, 6416, 8514, 12886.5, N ATL, Trop.
 17022.5, 22487, 26135 Disturbances
 (Every six hours: 0035, 0635, 1235, 1835)
 0135 SAME FREQ N PAC, Trop.
 (Every six hours: 0135, 0735, 1335, 1935) Disturb.
 0335 SAME FREQ Western N ATL
 (Every six hours: 0335, 0935, 1535, 2135)
 0435 SAME FREQ Gulf Of Mexico
 (Every six hours: 0435, 1035, 1635, 2235)
 0535 SAME FREQ CAR, SWN ATL
 (Every six hours: 0535, 1135, 1735, 2335)

Ft. Lauderdale (AT&T)	WOM	0040+EH	4215.5, 6327.5, 8432.5	Gulf, CAR, W N ATL
			12631, 22425.5	
			(40 minutes past even hours)	
Boston, MA (AT&T)	WOO	0020+EH	4212.5, 6328, 8051.5, 8433 E Coast, ATL	
			12632	
			(20 min. past even hours)	
Chatham, MA (Globe)	WCC	0440	4216.5, 6324, 8424, 8426.5 ATL, Gulf,	CAR (ATOR)
			12589.5, 12598, 16817,	
			16825, 22386.5	
		1240	Same	
		1640	Same	
			Same	Same
Halifax, NS	VCS	0630	4213.5, 8419.5	Western N ATL Same
		2300	Same	
Rogers City, MI (Globe)	WLC	1503	6316	Great Lakes

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Legend:

AST = Atlantic Standard Time, ATL = Atlantic, CAR = Caribbean, CST = Central Standard Time, G/C = Gulf Coast, PAC = Pacific.

Notes:

1. "Same" usage in the listings means that frequencies and/or coverage areas remain the same for this new time, as for those listed immediately above. Changes in broadcast formats occur occasionally; you must listen for current format.
2. See the Glossary for definitions of terms. See also the Weather Section in the Common Information Chapter.
3. WX reports on public coast stations are normally given after traffic lists (AT&T, Globe, MMRI, etc.). Traffic lists and WX reports may be canceled on channels with traffic in progress at the scheduled time for Traffic List/ WX transmission.
4. There are many local, regional, and high seas WX broadcasting stations world-wide. Listing them here is beyond the scope of this Guide. See the Admiralty Publications for full lists. See also the WX FAX Frequency List and VHF Frequency List.
5. Special demodulators are required to receive TOR, ATOR, SITON, and NAVTEX broadcasts. Single function demodulators can cost around 100 dollars and up. The multi-function Terminal Node Controllers (TNCs), used by hams for PACKET/ AMTOR, are around 300-400 dollars and can demodulate many common transmissions including WX FAX and Morse code (CW). See also the section on WX FAX.
6. Recording broadcasts with a tape recorder is recommended to allow review and verification of specific details. Recording CW WX on a two speed recorder can be helpful. Recording at high speed and playback at slow speed makes it easier to copy.
7. Some USCG Stations have 800 numbers available to discuss WX forecasts. NMN, Portsmouth, VA is (800) 742-8919.
8. Many USCG stations also transmit scheduled WX broadcasts on MF 2670 kHz.

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APPENDIX 16. US/ CANADIAN WEATHER FAX FREQUENCIES

In Location Order

Note: Schedules change very often . Check with the station- see Appendix 2 for phone numbers and web sites.

Location	Station	Schedule Print Time (UTC)	"Assigned" Frequencies (kHz)
Guam (US Navy)	NPN		5260, 10255, 19860, 23010
Pearl Harbor (US Navy)	NPM	0000, Wed/ Sat	4855, 9396, 21837
Honolulu (NOAA/NWS)	KVM70	0533,1133,1733,2333	5037.5, 7770, 9982.5, 11090, 16135, 23331.5
Adak, AK (US Navy)		Same as NPM (Relay)	8492.5
Kodiak, AK (USCG)			4298, 8459
Stockton, CA (US Navy)	NPG	Same as NPM (Relay)	6453, 9090
San Francisco (USCG)	NMC	2019, Daily	4346, 8682, 12730, 17151.2, 22527
Mobile, AL (MMRI)	WLO	1500, Daily	2572, 6852, 9157.5
Norfolk, VA (US Navy)	NAM	0000, Daily	3357, 8080, 10865, 15959, 20015
Boston, MA (USCG)	NMF NIK		3240.1, 7528.1, 8502 12750
Halifax, NS	CFH	1014, Tue,Thu,Sat	4271, 6330, 10536, 13510

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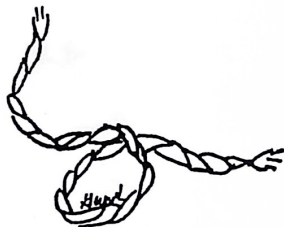
Rogers City, MI WLC

2195.5, 5898.6

Notes:

1. A demodulator is required to decode FAX transmissions.
2. "Schedule print time" above is the time broadcast schedules are transmitted.
3. Most Transmissions are USB, minus 1.7-1.9 MHz shift from Assigned Frequency. E.G. For Guam: 5.260 - 1.9 = 5.258.1 MHz (5258.1 kHz) Dial Frequency. Tune for best contrast.
4. See WX FAX Operations in the Common Information Chapter for further details.

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APPENDIX 16B. INTERNATIONAL WXFAX STATIONS.

In Frequency Order

Thanks to Bob Tedbury G6SNY for compiling this list and allowing its inclusion. Unless otherwise stated transmission parameters are 120/576 LPI format. Many Eastern European stations are on 60 or 90 /576.

FREQUENCY	STATION	COUNTRY	REMARKS
2.3740	NORTHWOOD 1 MARINE	UK	.
2.6185	BRACKNELL 2	UK	.
2.628	MELBOURN	AUSTRALIA	.
2.720	SAMARA MET	RUSSIA	.
2.752.5	CANADIAN MILITRY	CANADA	RTTY & FAX
2.815	MOSCOW MET	RUSSIA	.
3.235	MINSK MET	BELARUS	.
3.2895	BRACKNELL 1	UK	.
3.357	USN MET.		.
3.360	KIEV MET	UKRAINE	.
3.3770	ANKARA	TURKEY	.
3.34368	LONDON NAVAL	UK	.
3.398	USAF	ROOSEVELT/HOMESTEAD	.
3.6500	MADRID MET	SPAIN	.
3.6520	NORTHWOOD 1 MARINE	UK	.
3.7100	SAMARA MET	IRAQ 60/576	.
3.810	MINSK MET	BELARUS	.
3.8550	OFFENBACH (HAMBURG)	GERMANY	.
3.8750	MOSCOW MET	RUSSIA	.
4.014	PRETORIA MET	RSA	.
4.2478	LONDON MET	UK	.
4.266.1	CANADIAN MILITRY	CANADA	RTTY & FAX.
4.271	HALEFAX MET	CANADA	.
4.3070	NORTHWOOD 1 MARINE	UK	.
4.365	TASHKENT MET	USBKISTAN	.
4.525	KIEV MET	UKRAINE	.
4.560	UNID		.
4.5701	GRENGEL MET	GERMANY	.
4.575	SAMARA MET	RUSSIA	.
4.6100	BRACKFELH 1	UK	.
4.6230	SIGONELLA US NAVY	ITALY	.
4.704	MORON US NAVY	SPAIN	.
4.757	USAF WXFAX SERVICE		.

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FREQUENCY	STATION	COUNTRY	REMARKS
4.7775	ROME MET	ITALY	
4.782	BRACKNELL 2	UK	
4.7855	GRENGEL MET	GERMANY	
4.790	DAKAR MET	SENEGAL	
4.855	USAF	ROOSEVELT/HOMESTEAD	
4.993	DELHI MET	INDIA	
5.785	US NAVY ROTA	SPAIN	
5.8000	BELGRADE MET	UGOS.	
5.805	AUCKLAND	N ZEALAND	
5.807	AUCKLAND MET	N ZELAND	
5.850	COPENHAGEN	DENMARK	
5.8645	SIGONELLA US NAVY	SPAIN	
5.890	TASHKENT MET	USBEKISTAN	
6.418	NAVAL	CHILI	
6.4363	LONDON NAVAL	UK	
6.452	NORTHWOOD 1 MARINE	UK	
6.454.1	CANADIAN MILITRY	CANADA	RTTY & FAX.
6.496	HALIFAX NS	CANADA	
6.790	ANKARA	TURKEY	
6.821	USAF WX	USA	
6.830	MADRID MET	SPAIN	
6.840	MOSCOW MET	RUSSIA	
6.910	NORRKOPING MET	SWEDEN	
6.918	LAS PALMAS	SPAIN	
6.950	KIEV MET	UKRAINE	
7.398	USAF	ROOSEVELT/HOMESTEAD	
7.403	DELHI MET	INDIA	
7.4950	TBILISI	GEORGA	
7.508	PRETORIA MET	S AFRICA	
7.530	BOSTON GG	USA	
7.535	DARWIN MET	AUSTRALIA	
7.570	TASHKENTMET	UZBEKISTAN	
7.582	USN	DIEGO GARCIA	
7.635	RUSSIAN MET	RUSSIA	
7.750	MOSCOW MET	RUSSIA sat data 1315	
7.640	MINSK	BELARUS	
7.670	MOSCOW MET	RUSSIA	
7.762	ARCHANGEL MET	RUSSIA	
7.870	USAF	ROOSEVELT/HOLMSTEAD	
7.880	HAMBURG (OFFENBACH)	GERMANY	
7.910	ALMATY MET	KAZAKHSTAN	

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FREQUENCY	STATION	COUNTRY	REMARKS
8.000	US NAVAL	THURSO	
8.040	BRACKNELL 1	UK	
8.0775	NORRKOPING MET	SWEDEN	
8.080	USN HURRICAIN	US	
8.083	TASHKENT MET	UZBEKISTAN	
8.1466	ROME MET	ITALY	
8.3315	NORTHWOOD 2 MARINE	UK	
8.3420	NORTHWOOD 2 MARINE	UK	
8.502	US COASTGUARD	USA	
8.5279	LISBON	PORTUGAL	
8.530	ATHENS MET	GREECE	
8.682	US COASTGUARD S/FRANCISCO	USA	
8.7654	US COAST CARD	US	
8.7654	US COAST CARD	US	
9.050	USN	ITALY	
9.100	ROSTOV MET	RUSSIA	
9.150	TASHKENT MET	UZBEKISTAN	
9.2030	BRACKNELL 2	UK	
9.220	NOVOSIBIRISK MET	RUSSIA	
9.230	KHABAROVSK MET	RUSSIA	
9.318	US NAVY	ICELAND	
9.318	GRENGEL MET	GERMANY	
9.340	TASHKENT MET	UZBEKISTAN	60/576
9.360	COPENHAGEN MET	DENMARK	
9.373	SIGENOLLA US NAVY	ITALY	
9.3825	MORON US NAVY	ITALY	
9.438	TOKIO MET	JAPAN	
9.875	US NAVAL ROTA	SPAIN	
9.970	TOKIO MET	JAPAN	
10.107	DELHI MET	INDIA	
10.115	NARIOBI MET	AFRICA	
10.117	BEIJING MET	CHINA	
10.123	CAIRO MET	EGYPT	
10.130	MURMANSK MET	RUSSIA	
10.230	MOSCOW MET	RUSSIA	
10.250	MADRID MET	SPAIN	
10.555	DARWIN MET	AUSTRALIA	
10.536	HALIFAX MET	CANADA	
10.712	MOSCOW MET	RUSSIA	
10.720	BUENOSARIES MET	S AMERICA	
10.865	US NAVAL ? NORFOLK	USA?	

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<u>FREQUENCY</u>	<u>STATION</u>	<u>COUNTRY</u>	<u>REMARKS</u>
10.997	USAF	ROOSEVELT/HOLMSTEAD	
10.980	MOSCOW MET	RUSSIA	
11.030	MELBOURN MET	AUSTRALIA	
11.0865	BRACKNELL 1	UK	
11.4850	SIGONELLA US NAVY	ITALY	
11.525	MOSCOW MET	RUSSIA	
11.622	USAF	ROOSEVELT/HOLMSTEAD	
12.165	MOSCOW MET	RUSSIA	
12.317	NAIROBI MET	AFRICA	
12.320	NOVOSIBRSK MET	RUSSIA	
12.730	SAN FRANCISCO MET	USA	
12.741	LONDON NAVAL	UK	
12.750	US MARINE FORCAST	?	MAPS AT 1720
12.751	CANADIAN MILITARY	CANADA	RTTY & FAX
12.806	USN	DIEGO GARCIA	
13.405	MOSCOW MET	RUSSIA	
13.510	HALIFAX	CANADA	
13.550	AUCKLAND MET	NEWZEALAND	
13.597	ROME MET	ITALY	
13.669	DAKAR MET	SENEGAL	
13.707	ALMATY MET	KAZAKHSTAN	
13.8825	HAMBOURG (OFFENBACH)	GERMANY	
13.920	MELBOURN MET	AUSTRALIA	
13.947	TASHKENT MET	UZBEKISTAN	
14.4360	BRACKNEL 1	UK	
14.367	BEIJING	CHINA	
14.5825	BRACKNEL	UK	
14.685	TAIWAN	CHINA	
14.692	TOKIO	JAPAN	
14.842	DELHI	INDIA	
14.982	TASHKENT	UZBEKISTAN	
15.57793	UNID		
15.615	DARWIN	AUSTRALIA	
15.644	US NAVY ROTA	SPAIN	
15.781	USAF	ROOSEVELT/HOMESTEAD	
15.959	USN		
16.040	RAF LONDON	UK	
16.3401	AUCKLAND MET	N ZELAND	
16.410	US NAVY NORFOLK	USA	
16.9120	NORTHWOOD SUMMER	UK	
16.914	USN		

Cruiser's Radio Guide, Part Vb, Frequency Data

<u>FREQUENCY</u>	<u>STATION</u>	<u>COUNTRY</u>	<u>REMARKS</u>
16.971	TOKYO RADIO	JAPAN	60/576
17.151	SAN FRANCISCO	USA	
17.367	NAIROBY MET	AFRICA	
17.510	COPENHAGEN MET	DENMARK	
17.585	MORON US NAVY	ITALY	
18.060	DARWIN MET	AUSTRALIA	
18.130	TOKIO MET	JAPAN	
18.220	TOKIO MET	JAPAN	
18.233	DELHI MET	INDIA	
18.238	PRETORIA MET	S AFRICA	
18.261	BRACKNELL MET SUMMER	UK	
18.486	USN		
18.710	MOSCOW MET	RUSSIA	
18.940	CHINA		
19.275	KHABAROVSK MET	RUSSIA	
19.363	USAF	ROOSEVELT/HOMESTEAD	
20.015	USN NORFOLK (RESERVE FRE.USA.)		
20.030	USN	DEIGO GARCIA	
20.469	CANBERRA MET	AUSTRALIA	
21.735	USN	HAWAII	
21.873	USN	PEARL HARBOUR	
22.541	TOKYO	JAPAN	
22.742	BEIJING MET	CHINA	
22.770	TOKIO MET	JAPAN	
23.523	TOKYO MET	JAPAN	
24.468	MELBOURN MET	AUSTRALIA	

List compiled by and with permission of Bob G6SNY

Cruiser's Radio Guide, Part Vb, Frequency Data

APPENDIX 17. AUTHORIZED AMATEUR FREQUENCIES

BY ITU REGION

Full ITU band limits are shown below. There are further sub-band limits in the US for each class of license and for emission modes (see the Emission Appendix). See Paragraph 97.301.a-f for specifics and limitations.

Within country or territorial waters limits there may be other band limits or mode sub-band limits imposed by individual countries. Follow the limits given for your primary or any reciprocal license.

In international waters follow the limits of your home country license class, with the additional ITU region limits given below. Your home country ham license should follow the country of registration of your vessel.

Band	Region 1	Region 2	Region 3
160M CW	1810-1850	1800-2000	1800-2000
160M Voice	1840-1850	1840-2000	1800-2000
80M CW	3500-3800	3500-4000	3500-3900
80M Voice	3600-3800	3525-4000	3525-3900
40M CW	7000-7100	7000-7300	7000-7100
40M Voice	7040-7100	7040-7300	7030-7100
30M CW	10100-10150	10100-10150	10100-10150
30M Voice	Not Authorized	Not Authorized	Not Authorized
20M CW	14000-14350	1400-14350	14000-14350
20M Voice	14100-14350	14105-14350	14100-14350
17M CW	18068-18168	18068-18168	18068-18168
17M Voice	18110-18168	18110-18168	18110-18168
15M CW	21000-21450	21000-21450	21000-21450
15M Voice	21150-21450	21150-21450	21150-21450
12M CW	24890-24990	24890-24990	24890-24990
12M Voice	24930-24990	24930-24990	24930-24990
10M CW	28000-29700	28000-29700	28000-29700
10M Voice	28200-29700	28300-29700	28300-29700

See notes and examples on the next page.

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Notes:

1. See The International Operations paragraph for definitions of ITU geographic region limits.

2. US licensed amateurs General Class and above are authorized to use voice mode on 7075 to 7100 kHz when operating within international waters or US territory in ITU Regions 1 and 3, and when operating within ITU Region 2, South of 20 degrees North or West of 130 degrees West (Ref. Para. 97.307 {f}, note 11).

3. See Part 97 for full US amateur band and sub-band limits.

Operating Privilege Examples:

1. A US licensed General Class operator operating MM in international waters in ITU Region 3 has the following 80 meter voice privileges:

1. US General Class voice limits: 3850-4000.
2. ITU Region 3 voice limits: 3525-3900.

Therefore, a US licensed General Class operator, operating MM in international waters in ITU Region 3, has these 80 M voice privileges:

3850-3900 kHz.

2. A US licensed General Class operator has no operating privileges in international waters within ITU Region 1 on the voice sub-band of 80 meters.

1. US General Class voice limits: 3850-4000.
2. ITU Region 1 voice limits: 3600-3800.

3. An Advanced Class operator would have the following 80 M voice privileges in international waters within ITU Region 1:

1. US Advanced Class voice limits: 3775-4000
2. ITU Region 1 voice limits: 3600-3800

Therefore, a US Advanced Class operator in international waters within ITU Region 1 has these 80 meter voice privileges:

3775-3800 kHz

APPENDIX 18. K0YY (ex W6SOT) MARITIME MOBILE NET LIST

TIME ORDER SEQUENCE, AS OF JULY 1997

M/M nets shown in caps. "1" = Checked recently. Please send Email updates to: rogerk0yy@aol.com

<u>Time(UTC)</u>	<u>Freq-MHz</u>	<u>Net Name</u>	<u>Days</u>	<u>Cov. Area</u>	<u>Details</u>	<u>Contact</u>
0000+	3.968	HAPPY HOUR	Dly	Baja, W/Mex	MM, Social	WP2F
0000	14.320	SEA MM Net	Dly	S/PAC, W/PAC	MM	
0100	3.925	Gulf Coast Hurr. Net	Dly	G/C USA	WX, TFC	WD5CCR
0130>0300+	28.313	10 METER M/M	Dly	E/PAC-Haw.	Novice OK	NGURW
0200/0100+	21.402	HAPPY HOUR	M-F	PAC/Baja, C/A	MM/ Social	K7YDO
0200	14.334	Brazil/East Coast Net	Dly	E/C, ATL	WX, TFC	K3UWJ
0200	3.932	Great Lakes Emerg.	Dly	G/L	WX, TFC	WD8ROK
0200>0400+	14.300/313	SEAFARER'S NET	Dly	PAC, W/C	MM	WA6ZEL
0300+	14.116	Traveler's Net	Dly	W/PAC-I/O	TFC MM	VK6BO
0330/0230+	7.294	Sandia Net	Dly	W/C, Baja	Social	KA6HFG
0400+	14.115	CANADIAN DDD	Dly	PAC	W/U 0330	VE7DB
0400+	14.318	ARNOLD'S NET	Dly	S/PAC	MM, WX	ZK1DB
0500/0400+	14.313	PAC MAR NET	Dly	PAC	W/U	KH6UY
0500	21.200	UK/ NZ/ AFRICAN	Dly	PAC, Ind OC	MM	VK3PA
0530/0430+	14.313	PACIFIC	Dly	PAC	MM,	KH6UY
		MARITIME			Roll Call	
0630+	14.316/105	SO AFRICAN MAR	Dly	S/ATL, Ind OC	Also 1130	ZS5GC

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<u>Time(UTC)</u>	<u>Freq-MHz</u>	<u>Net Name</u>	<u>Days</u>	<u>Cov. Area</u>	<u>Details</u>	<u>Contact</u>
0630	14.313	INTERNATIONAL MM	Dly	ATL, MED, CAR	Also 1700	DK0CM
0700>0800+	7.085	MED. SEA CRUISER'S NET	Dly	MED SEA	MM	
0715+	3.820	BAY OF ISLANDS	Dly	NZ, Aus, PAC	MM	ZL1BKD
0800>0830+	14.315	Pacific Inter-Island	Dly	S/PAC, W/PAC	TFC	KX6QU
0800+	14.303	UK MARITIME	Dly	MED, PAC	Also 1800	G4FRN
0900	14.313	MED SEA MM NET	Dly	MED	MM	5B4MM
1000	14.313	GERMAN MM	Dly	ATL, MED	MM	DK0MC
1000+	14.320	South China Sea Net	Dly	W S/PAC		
1030	3.815	Caribbean WX Net	Dly	CAR	WX Also 2230	VP2AYL
1100/1000+	3.770	Mar Provinces WX	Dly	NE Canada	WX	VE1AAC
1100>1200+	7.237	CARRIBBEAN MM	Dly	CAR	MM	KV4IC
1100>1600+	14.300/313	Intercon Net	Dly	N/S/C/Am	TFC/ MM	N4LMC
1100+	14.283	Carribus Tfc Net	Dly	E/C, CAR	TFC	KA2CPA
1110	3.930	Puerto Rico WX Net	Dly	PR/VI	WX Also 2310	KP4AET
1115+	14.316	INDIAN OCEAN MM NET	DLY	W/PAC, I/O	move to 14.320- 340MHz	VK6HH
1130+	14.316/105	SOUTH AFRICAN Net	Dly	S/ATL, Indian Oc.	Also 0630	ZS5MU
1130	21.325	So Atlantic Roundtable	Dly	SO/ATL	MM	TY1ZAK
1200+	28.380	MARITIME MOB.	Dly		Novice OK	
1200+	14.121	Mississauga	Dly	E/ Canada,	ATL WX	VE3NBL

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<u>Time(UTC)</u>	<u>Freq-MHz</u>	<u>Net Name</u>	<u>Days</u>	<u>Cov. Area</u>	<u>Details</u>	<u>Contact</u>
2230	3.815	Caribbean WX Net		CAR	WX Also 1030	VP2AYL
2310	3.930	Puerto Rico WX Net	Dly	P/R, V/I	WX Also 1110	KP4AET
2330	21.325	So Atlantic Roundtable		SO ATL	TFC, Social	
AS NEEDED	14.325	Hurricane Net	A/R	ATL, CAR, PAC	Hurricane Tracking	K0IND

LEGEND:

ATL= Atlantic, CAR= Caribbean, C/A= Central America, EC= East Coast, EPAC= East Pacific, G/C= Gulf Coast, MED= Mediterranean, MM= Maritime Mobile, R/C= Roll Call--passage maker positions taken, TFC= Traffic, W/C= West Coast, W/PAC= West Pacific, W/U= Warm Up session- check-ins, WX= Weather, "+-" = Net information checked recently, "***" = No current information, may be outdated, ">" = Net operates from /to times listed, "/" = Net time changes from/ to for daylight savings or summer to winter.

FOOTNOTES:

1. Credits: Many thanks to the dozens of people, both cruisers and base stations, who have provided this information. Cruisers "out there" and dedicated base stations are often the only source of updated information. All updates are appreciated. Please send to Roger Krautkremer K0YY(ex W6SOT & ex SV Fantaseas), 2539 S. Fairplay Way, Aurora, CO 80014-2522. Voice mail/ fax 303-695-8715. On the air, please contact me on the MANANA Net 14.340 MHz 1900Z. Email: rogerk0yy@aol.com. Thanks also to those hard working Net Managers, Net Controls, and Relay/ Two-way Stations. We all appreciate your efforts!

2. Amateur Nets:

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MM Nets are shown in capital letters; Other nets listed above provide information or service useful to cruising hams. MM Nets are active nearly world-wide, 24 hours a day, between 14.300 - 14.320 MHz.

Traffic Nets: In the US, many state and regional Traffic Nets exist on 75 and 40 meters, normally above 3.900 MHz on 75 and 7.225 MHz on 40. Most are active in the early evening. Cruisers may find them useful for phone patches and message traffic.

VHF/ 2 Meter Nets are run in popular cruising grounds and often provide check-ins, WX and sometimes wide area linked systems. The Canadian Straits Of Georgia system has several repeaters linked together covering the entire Straits Of Georgia area. It runs daily MM Nets in the late afternoons during the summer months. The Chesapeake Bay 2 Meter Net provides check-ins and WX during the summer months.

3. Operators are strongly cautioned to check appropriate band allocations, operator privileges, reciprocal licensing agreements, third party traffic agreements, and net protocols before transmitting.

4. Nets often vary over time and frequency, based upon propagation conditions and QRM. If nets are not found when or where listed, listen around plus or minus frequency/ time.

5. Marine Band Nets:

Marine VHF Nets are frequently run in popular cruising areas. Examples are the Downwind Cruisers Net on Ch 68, 0900 M-F, in San Diego; and the Cruisers Net in La Paz, Baja Mexico on Ch 22.

Marine HF Nets are often run for regional areas. Popular examples include the Keri-Keri Net, (New Zealand) Western S PAC on 2480/ 4417/ 4445 kHz, WX at 1925/2000L, Position Reports taken at 0800/1900 Local time. Caribbean SSB Net on 6.215 MHz at 1200/2300Z. Herb's WX Net (Southbound ID) on 12A, 12.353 MHz at 1900/2400Z, detailed WX for E/C and CAR 12329T/ 13176R, #1642-16483T/17365R.

Informal nets are often held during popular passage making times. Examples include the 8A, 8.294 or 12B, 12.356 MHz nets for boaters heading south from San Diego to Baja and visa versa. WX information is often provided. Additions to the Marine Band Net List are requested. Thanks! Roger.

6. Information: Photo copying of this MM Net List for free distribution is authorized, as long as credit is given and the entire list is published including the legend and all footnotes. Entering the list into a computer database or any other use requires written permission.

APPENDIX 19, HF AMTOR MAILBOXES

(Amateur Radio Service, as of 1997)

Special thanks to Joost ZS5S for this list.

Licensed radio amateurs (US General Class and above) may send and receive messages via these mailboxes using Amtor mode. These Amtor mailboxes operate 24 hours a day unless noted and forward directly to their local Packet network. The frequency(s) listed is the mark frequency. See The Advanced Operations paragraph for explanations of AMTOR and Packet addressing schemes.

Legend:

(GT) = G-Tor on the same frequency

(P) = Pactor on the same frequency

<u>Call/ Address</u>	<u>Time</u>	<u>Frequency</u>	<u>Notes</u>
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North America

AA5BJ.NM.USA.NA	7075	10131/33/34	14065 (P)
AA5CQ.USA.NA	7071	10140.5	14070.5
AB4SR.FL.USA.NA	14079.5		
AF5D.#SAT.TX.USA.NA	3620	7070.5/75	10128/40.5 14070.5/73.5 (P)
AL7LS.AK.USA.NA	14072.5		
K2PPH.#WNY.NY.USA.NA	14069/70/72.5/73/73.5	21070/75	
K4YZU.KY.USA.NA	7069/70/70.5/71/72.5		
KC9PX.WI.USA.NA	3620/22/27	7068/69.9/70.5/72.5/75.5	14069/70.5
	14072.5/73.5/75	18109	21072.5/76/79 28075/28
KD4OM.#HKY.NC.USA.NA	7070.5		
KK4WW.#VA.USA.NA	14075	(2100-1000) (md)	
KQ4ET.#SEVA.VA.USA.NA	3618/20/22	7069/71/72.5	10126/28
	14071.5/73.5		
N01A.#SONEV.NV.USA.NA (P)	3629	7069/73/75	10131/33 14116 0200
	1300: 1825	3625/27	1300-0200: 14071/75/112.5/18 18105 21073 24913
	28127		
N2JAW.NY.USA.NA	3622	7071/72.5/75.5	10128/40.5 14068/71.5/73.5
	21072.5		
N3EXW.MD.USA.NA	14068		
N3PGG.#CEMO.MO.USA.NA	3622	7067/69	10128
N4WXL.#BHM.AL.USA.NA	14067		

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Call/ Address	Time	Frequency	Notes
N5TC.#STEX.TX.USA.NA	3622 7069 7071 7073	10126 14068.5	
N7RAH.AZ.USA.NA	3627/29/31 7069/71/73	10127/29/33 14071/72.5/73	
NA7P.WA.USA.NA	14069		
W1FYR.NH.USA.NA (NTS only)	3620/22 7068/71/72.5	10126/28/30	
	14068/70/71.5/72.5/73.5	18102.5/05.5 21072.5/74/79	
W2NRE.#ENY.NY.USA.NA	3620/22 7070/72	10126/28 14112.5/18 18105	
	24915 28074 (P)		
W3GL.#APL.DE.USA.NA	7068/70/70.5/71/7100.34	14073/74/112.5/118	
	21073		
W4KAU.NTSGA.GA.USA.NA	7070.5/71/72/75.5/76	10126/28	
	14069/70.5/72.5/76 21072.5/74		
W4NPX.#CVA.VA.USA.NA	3620/27.87/30.87 7068/70/72/63		
	.87/65.87/7104.37 (P)	10126/28/32.87/33.87/42.37	
	14063.87/65.87/70/72/76.87	21063.87/74 28128	
W5ZIT.TX.USA.NA	7071/73/75 10131/33/34 (GT)(P)(M)		
W7DCR.OR.USA.NA	3622/23/27 7069/75.5	10126/27/28	
	14069/70/75/77/118	21069/74/76/81 24915/25 (P)	
W7UJ.#WWA.WA.USA.NA	3605/20/22 7068/69	10126/28 14068/69/118	
	18104.5/05.5 21078/79 (P)		
W8KCQ.OH.USA.NA	3645 7071/73.5	10128 14079/80 18107.5 21079	
	28079		
W9UWE.IL.USA.NA	7079 14073/85	21079/81 28075	
WA1URA/9.IN.USA.NA	3620/21 7071/75.5/7101.5	10126/28/39.5/40.5	
	14069/70.5/71.5/73.5/75/112.5/118	21074/76/79 (P)	
WA2MFY.NJ.USA.NA	3622.5/42/45 7071/73.5/75.5/76.5/77/81.5		
	10128/29.5 14068/68.5/69/69.5/70.2/70.5/73.5/74/79/80	18107.5	
	21070.5/73.5/75/76/79	24915 28071/74 (no forwarding)	
WA7EES.#APL.OR.USA.NA	1817 3620/22/25/27/29/31	7069/71/75.5	
	10126/27/28/31/40 14069/70.5/71.5/72.5	18102.5	
WA8DRZ.#NOCAL.CA.USA.NA (P) - * off the air? *	10126/27/28/29		
	14068.5/69.5/70.5/71.5/72.5/73.5/74.5/75.5		
WB8APD.OH.USA.NA	14.071.5		
WB5UJO.#CENTEX.USA.NA	7075		
WD8NIK.#SEMI.MI.USA.NA	7068/70/71/72.5 or 7076		
WG1FN42KK.MA.USA.NA	3620/22/25/27 7070/71/72/72.5/73		
	10126/28/30/40 18104/06 21074 24917 28128 (P)		
WX4J.#SWITZ.FL.USA.NA	3618/20/24 7069/71.5/73.5/75.5		
	14071.5/72.5/73.5		
TG9SO.#GU.GTM.NA	7068 Nights	14068 21074 Days	
VE3AWC.ON.CAN.NA	7071/73.5/77	14078/79/80 (P)	
VE3PAO.#SCON.ON.CAN.NA	14066		

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address	Time	Frequency	Notes
VE7CIZ.#VANC.BC.CAN.NA	14072/74	21072/74 (P)	
VO1BBS.NF.CAN.NA	7037 10126	14068.5/72 18105 24915 28082	
XE2/WP2B.#ENS.BCFA.MEX.NA	14069		
ZF1GC.#GC.CYM.CAR.NA	14070.5/71.5/72.5/73.5/74.5/75.5/76	21080	
	weekdays: 1100-0300 - Fri: 1100-2200 - Sat: 0000-0300		

South America

9Y4IBN.CHV.TRN.SA 1200-1400 7045, 1400-1600 14073.5 beam NA/EU

Europe

GB7SIG.#45.GBR.EU	3581/87.5/88.5/89	7038/39/40	10145/46
	14076/77/78	18105.5 21080/81	28075
HB9AK.CHE.EU	3581/83/88	7038/40/41	10142/46 14071/72/78/98
	18102	21071/80 (P)	
HB9CGB.CHE.EU	3576 7880	14076/78/80/82	21076/78/80/82
LA7D.NORSEA.L.NOR.EU			
	1840 3581.5/87.5	7038/40 14068/71/75	21072.5/75/77 24925 (P)
OH2BAW.FIN.EU	3581.5/87	7037/38	10146 14068/70/71/76 21077.5 (P)
ON6RO.LG.BEL.EU	7037/38/40	10146 14065.5/68.5/70/71/73/75	
	21073/75.5/76 (P)		
OZ2AMT.ISH.SJL.DNK.EU			
	0600-1730: 14067.5/68.5/73/75	21067.5/73/75.5 - beam S	1730-2200:
	3578/87.5/89 7038/40	14067/68.5/73/75 - vertical (P)	
PA0RVR.NLD.EU	0600-1800: 14068/69/70/71/72/74/75/77		
SM6FMB.GBG.O.SWE.EU	7037/38	10141/45/46	14068/72/73/74/75/76
	18105	21073/74/76/80	24915 28075 (P)
U5WFL.VV.UKR.EU	14075 - beam: USA		
UA4LCQ.#ULY.RUS.EU	14075 21075	beam: USA	

Oceania

FK8BK.NCL.OC	14066 (0700-1300z)		
VK2AGE.#NE.NSW.AUS.OC	VAGE	7045 10111/27	14075/77 21076 (P)
VK2EHQ.NSW.AUS.OC	- 7042/45	10122/24/26	14070.6/73.1
VK2OG.NSW.AUS.OC	- 2000-0800: 14069	beam USA	
ZK1DB.CK1.OC	7045 (1700-2000)	10128 (2000-1000)	
ZL4AK.#54.NZL.OC	0300-0500: 10109/11/15/20/27/28/32/33/34/35	2100	
	-0300: 14068/69/70.5/71/72/74/75/77/81	21070 21072 21074 21076 21079	
	(P 0500-2100)		

APPENDIX 20, HF PACTOR MAILBOXES

(Amateur Radio Service, as of 1997)

List Courtesy of Joost ZS5S

Licensed amateur radio operators (US General Class and above) may pick up and deliver Pactor mode digital messages via these Pactor mailboxes. The MBOs marked with (W) or (X) forward directly into the internet using special Winlink software. The frequency(s) listed are the mark frequency.

Legend: Explanation of codes used:

MBO s/w system: (E) = Express, (G) = GPLX, (K) = W8KCQ, (M) = MSYS,
(O) = Other, (+T) = Plusterm, (W) = Winlink
On same freq's: (GT) = G-Tor, (P2) = Pactor-2
Type of antenna: (B) = beam, (V) = omni directional/vertical
For sysop only: (X) = Operates Winlink 'External'

[illegible]

North America

AA1BN.FN32WP.MA.USA.NA - John - 7077.87 - (M) <== NEW
AA5BJ.NM.USA.NA - Dusty - 7075 10131 10134 14065 (W)
AA7HS.#EWA.WAS.USA.NA - Steve - Yakima - (W)
(X)stevehs@wolffenet.com
3605.37 3627 7069 7070 7071 7073 7075.5
AF5D.#SAT.TX.USA.NA - Joe - San Antonio - Oldham@connecti.com - (W)
3620 7070.5 7075 10128 10140.5 14070.5 14073
K1UOL.CT.USA.NA - Bob - 3620 3621 7071 7072.5 7075.5 7077 7101.5
10126 10128 14064.5 14068.5 14071.5 14076 14118
K2PPH.#WNY.NY.USA.NA - 14069 14070 14072.5 14073 14073.5 21070
21075
K4CJX.#MIDTN.TN.USA.NA - Steve - Nashville -
waterman@telcores.com - (W)(X)
3621 3623 7070.5 7072.5 7101.5 10128 10140.5 14112.5 14118
K7SLI.#NWWA.WA.USA.NA - Jim - Seattle - basalop@eskimo.com
3627 3629 3632 7068 7069 7071 7073
10127 10128 10129 10140.5 14069 14071 14073 14118
KB8LUJ - ? - (P2)(+T)



Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address Name Location Notes Frequency Internet Address
 KC5LT.#MM.CA.USA.NA - Allan - San Diego (W) - **dedicated MM**
 3622 3627 3629 7069 7073 7075.5 10127 10128 10131
 14069 14070.5 14075 18105 21072.5
 KD7UM.#SLC.UT.USA.NA - Dave - 3621 3623 3627 7073 7075 7077
 10127 10129 14069 14073 14077 21071 21075 28127
 NO1A.#SONEV.NV.USA.NA - Bud - Las Vegas - budn0ia@aol.com
 3629 7069 7073 7075 10131 10133 14116
 0200-1300: 1825 3625 3627
 1300-0200: 14071 14075 14112.5 14118 18105 21073 24913 28127
 NOZO.#LAKE.FL.USA.NA - Pat - (X) n0zo@unix.cde.com - (W)
 7070.5 7072 7101.5 - 0400-1300: 3618 3620 3622 3623 3624
 1300-0400: 10126 10128 10140.5 14067 14069 14112.5 14118
 N1NNM.#ENC.NC.USA.NA - Luke - Millcreek - vert. (W)
 (X) z3f3q3mh@abaco.coastalnet.com - 7072 7077 7101.5
 0000-1200: 3618 3620 3621 3622
 1200-2400: 7077.94 10126 10130 10140.5 14070 14077
 N3PGG.#CEMO.MO.USA.NA - Tom - 3622 7067 7069 10128 - (W)
 N5TC.#STEX.TEX.USA.NA - Tom - College Station - (W)
 3628 7066 7067 7068 10135 10136 14078 18106
 N6EQZ.#APL.WA.USA.NA - Ted - (X) TedN6EQZ@aol.com - (W)
 3605 3620 3627 3629 7069 7071 7075
 14068.5 14069 14070.5 14071.5 14073.5 14075 14077
 18099 18105.5 21072 21074 28075 28125
 N7RAH.AZ.USA.NA - Don - Yuma/AZ - (W)
 3625 3627 3629 3631 7069 7071 7073 71075
 10127 10128 10129 10131 14069 14071 14072.5 14073
 N8PGR.#NEOH.OH.USA.NA - Hans - 71327.3541@compuserve.com - (W)
 3622 3623 7072 7068 10127.5 10135 14075 14080
 18101.5 21075 21080 28075 28080
 NO8M.#NEOH.OH.USA.NA - Steve - 3630 3635 7072 14074 21074 (M)
 NZ2T.#DFW.TX.USA.NA - Bob nr Dallas - 7067 7074 7077.9 7101.5
 10125.9 10128 10140.5 14068 14116 14118 - (V)(W)
 W2NRE.NY.USA.NA - Warren - (X) 76264.3107@compuserve.com - (W)
 3620 3622 3624 7070 7071.5 7072 10126 10128 10140.5
 14112.5 14118 14114 18104 18105
 W4NPX.#CVA.VA.USA.NA - Bob - Charlottesville -
 (X) 73522.1037@compuserve.com - (D)(W)
 3620 7068 7070 7072 10126 10128 14070 21074 28128
 W5KSL.#NOLA.LA.USA.NA - Angelo - New Orleans - (W)
 3620 3622 7069 7071 7075.5 7101.5 14068 14070 14073.5 14074 14079
 14112.5 14118 21074 21075 21079 28074 28075 28145 *(7 Mhz down)*

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address Name Location Notes Frequency Internet Address
 W5ZIT.TX.USA.NA - Jim - nr Dallas -
 7071 7073 7075 10131 10133 10134 (GT)(M)
 W7IJ.#WWA.WA.USA.NA - Bill - Roy - 71736.1220@compuserve.com - (W)
 3605 3620 3622 7068 7069 10126 10128 14068 14069 14118
 18104.5 18105.5 21078 21079, 0800-1600: 7040.85
 W7DCR.OR.USA.NA - Gary - Lapine - (X) gkaehler@bendnet.com - (W)
 3622 3623 2627 7069 7071 7075.5 10126 10127 10128
 14069 14070 14075 14077 14118 21069 21074 21076 21081 24915
 24925
 W8KCQ.OH.USA.NA - Bill - 3645 7071 7073.5 10128 14079 14080 (K)
 18107.5 21079 28079 - * no forwarding *
 W9MR.#SEIL.IL.USA.NA - Ken - Keensburg - (X) kenn@eriinc.com - (V)(W)
 3621 3622 7070 7076 7101.5 10126 10128 10140.5 14118
 18104 21072 24925 (vert)
 W9UWE.IL.USA.NA - Julius - (P2)(+T)
 7079 14073 14079 14085 21079 21081 28075
 WA1URA.IN.USA.NA - Frank nr Fort Wayne - (X) fmoore@cris.com - (W)
 3620 3622 7071 7075.5 7101.5 10126 10128 10139.5 10140.5
 14069 14070.5 14071.5 14073.5 14075 14112.5 14118
 21074 21076 21079
 WA2MFY - Peter - 3642 3645 7071 7073.5 7076.5 - (K) * NO forwarding *
 14068 14069 14070.5 14079 14080 21075 21076 21079 28071
 3622.5 7077 7081.5 10128 10129.5 14068.5 14069.5 14070.2
 14073.5 14074 18107.5 21070.5 21073.5 24915 28074
 WA7NTF.#TAC.#WWA.WA.USA.NA - gkohtala@halcyon.com - (GT)(M)
 1817 3627 3629 7069 7071 10127 10129
 14068.5 14072 14077 18105 21078 24925 28125
 WA8DRZ.#NOCAL.CA.USA.NA - Frank - San Francisco - (A)(D)(W)
 73126.3260@compuserve.com - 10126 10127 10128 10129
 14068.5 14069.5 14070.5 14071.5 14072.5 14073.5 14074.5 14075.5
 WA9WCN.IN.USA.NA - Bob - 70272.3212@compuserve.com -
 7070 7072 7101.5 - 2300-1100: 3621 3623
 1100-2300: 10140.5 14112.5
 WB2CJL.#WNY.NY.USA.NA - Bob - (B) EU (W)
 1300-2200: 14066.5 14068.5 14069 14070 14073 14112.5 21069 21073
 WB5UJO.TX.USA.NA - Hoppy - 7075 - (W)
 WB8NWQ.#CIN.OH.USA.NA - Vince -
 3620 3622 3624 3635 7072 10128 14066.5 14070 14072 14118
 WG1I.FN42KK.MA.USA.NA - Mike - Medford - (W)(SEP95)
 3620 3621 3622 3623 3624 3625 3628 7070 7071 7072 7072.5 7073

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address Name Location Notes Frequency Internet Address
 WG3G/MM/USA/NA - Bernie - Trinidad - (X) berniez@soca.trinidad.net
 1230-0300: 3618 7037 7107 10126 14062.87 14067 14070 18102
 FG5FU.GLP.CAR.NA - Andre - 14066 14067 14068 - (M)
 TG9QQ.GTM.NA - Toni - 14067
 TG9SO.#GU.GTM.NA - Roberto - 14068 (day 7068 (night)
 VA3VSM.#CON.ON.CAN.NA - Dave - 14068.5 14073 (local day light) - (W)
 (X) ve3vsm@muskoka.com
 VE2FK.CAN.NA - Claude - 7072 7073.5 7077 7081 10126 10128 (K)
 VE3EG.ON.CAN.NA - 0700-0900 & 1000-2300 EDT: 7071 7073.5 7076.5
 7077
 0900-1000 EDT: 14080
 VE7CIZ.#VANC.BC.CAN.NA - George - 14072 14074 21072 21074
 XE1M.#CALP.TLAX.MEX.NA - Valentin - 7061 - (M)(GT)
 ZF1GC.#GC.CYM.CAR.NA - Frank - fhgs@candw.ky
South America
 9Y4IBN.CHV.TRN.SA - Irvin - Trinidad
 1800-2000: 14073.5 - 1600-1800/2000-2100: 21073.5
 CPORCB.BOL.SA - Mark/CP5VW - 7075 - mburke@ns.entel.net
Asia
 4X6SL.ISR.AS - Kuti - Tel Aviv - (B)(W) - 14068 night 21071 day
 9K2EC.KWT.AS - Mohsen - Kuwait - (W) - EU: 7037 10145
 (B) 14066 14071 14080 18105 21071 21081
 AS/OC: 0900-1300 2100-0600 - EU 0600-0900 1300-2100
 AP5ARS.#ISL.PAK.AS - Tariq - Islamabad - (W)(X) ap2tj@paknet1.ptc.pk
 from 1300: 14065 14066 14069 14071 14073 14076 14079
 HS0/DLIZAV.THA.AS - Rudolf - Bangkok - (X) 100734.435@compuserve.com
 (W)
 14069.5 14072.5
 JA5TX.JPN.AS - Mitsuo - 14071 14072 14074 14076 14078 - (B)(G)(P2)
 OD5KU.LBN.AS - Elie - 7041 10145 14067 14075 14080 18105 21080 -
 (V)(W)
 TA3BBS.#IZM.TUR.AS - Mustafa - 14068 - (B) EU 0600-1700, AF 1700-0600
 (W)
 VR2FN.HKG.AS - Ray - Hong Kong - (P2)(V)(W) - rayfaulkner@attmail.com
 14079.5 14070.5 14071.5 14072.5 14073.5 14074.5 14075.5 21080
Oceania
 DU7/DJ6HH.EVIS.PHL.OC - Ruprecht - Cebu - (V)(W)
 1000-1400 2200-0100: 14069.5 or 14074 or 14079.5
 WH6FG.HI.USA.OC - Jim - Kauai - pilgram@aloha.net - (V)(W) NEW
 3605 3620 3627 3629 3632 7068 7069 7071 7073 7075
 14069 14071 14073 14075 14075.5 14118

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address Name Location Notes Frequency Internet Address
 VK2AGE.#NE.NSW.AUS.OC - Gordon - nr Brisbane - gadow@om.com.au
 7045 10109 14075 14077 21076 - (W)
 (B) NA 2330-0600 1030-1130 AF 0600-0800
 AS/EU 0800-0900 (LP) 0900-1030 1130-1300 1330-2330
 VK2DW.NSW.AUS.OC - Don - 2200-0600: 14068 - dipole (W)
 VK2DYX.NSW.AUS.OC - Carl - 14070 - (B)
 VK2EHQ.NSW.AUS.OC - Peter - 14071 -
 VK2OG.NSW.AUS.OC - Peter - Sydney - 0800-2000: 14069 - (B) EU - (W)
 VK3WZ.#MEL.VIC.AUS.OC - John - Melbourne - 2200-1100: 14071 (B) EU
 (W)
 VK5RQ.#SA.AUS.OC - 14073 - (V)(M)
 VK6TN.#WA.AUS.OC - Ernie - nr Perth - (W)
 14070 14071 14073 14075 14077 14080 14081 21071 21079
 (B) 0100-0300: E AUS/NZL, 0330-0900: AF/MDLE, 0900-1000 Far East
 1000-2400: AS/EU
 YB5QZ.#PKU.IDN.OC - Anton - Pekanbaru - (M) - (x) yb5qz@indo.net.id
 14073 - (B) 0000-0900 SE, 0900-1500 W * off air *
 ZL4AK.#54.NZL.OC - Bill - 0500-2100: (B)(W)
 3535 3537 3539 7028.3 7028.77 7029.5 7044.98
 10109 10111 10115 10120 10127 10128 10132 10133 10134 10135
Europe
 9A0APL.HRV.EU - Darko/9A6D - Zagreb - 14072 - (W)
 DK0MUN.#BAY.DEU.EU - Werner nr Munich - 14069.5 - (B) AS/OC - (W)
 GB7SIG.#45.GBR.EU - Jim/G3WGM - (B)(G)(W)
 14068 14071 14075 14080 21071 21076
 HB9AK.CHE.EU - Paul/HB9AKV - Meilen - (G)(P)(V) -
 100614.2414@compuserve.com -
 3581 3583 3588 7038 7040 7041
 14071 14072 14078 14098 18102 21071 21080
 ISFLN.ITOS.ITA.EU - Luciano - Florence - (W)
 14069 14073 21069 21073 - (B) NA 1700-2300 AF 0600-1600
 LA7D.NORSEA.L.NOR.EU - Geir/LA5ZO - Draupner platform - (V)(W)
 1840 3582 3587.5 7038 7040 14071 14075 14077
 21072.5 21075 21077 24925
 OE4XBU.AUT.EU - Rudi/OE4RYC - oe4ryc@bnet.co.at - (W)
 14073 14075 14078 14080 21073 21075.5
 (B) S during day and W during night
 OH2BAW.FIN.EU - Staffan - hermans@clinet.fi - (B)(W)(X)
 3581.5 3587 7037 7038 10146 14068 14070 14071 14076 21077.5
 OH2NPE.FIN.EU - Teo - Espoo - 10146 14074 - (B) East - (W)
 ON6RO.LG.BEL.EU - Rene - Liege - 101772.3550@compuserve.com - (W)

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address Name Location Notes Frequency Internet Address

7037 17038 7040 10146 14065.5 14068.5 14070 14071 14073 14075
21073 21075.5
(B)AF 0600-1000, AS 1000-1100 1900-0600, NA 1100-1900
OZZAMT.ISH.SJL.DNK.EU - Kristian/OZ6KN - nr Copenhagen - (W)
0600-1730: (V) 7038 7040 10146,
(B) SW 14067.5 14068.5 14073 14075 21067.5 21073 21075.5
1730-2200: (V) 3578 3587.5 3589 7038 7040 10146 (vert)
(B) W 14067.5 14068.5 14073
OZ4SCA.OZ2BOO.FRH.FYN.DNK.EU - Erik/OZ4KK -
erikj@pip.dknet.dk - (B)(G)(P2)(V)
3581 3583 3588 7038 7040 7041 10141 10146
14071 14072 14078 14098 18102 21071 21080
PA0RVR.#ZH2.NLD.EU Richard - nr Rotterdam - (W)
1800-0600: 14069,5 14070 14071 14072 14073 14074 14075 14076
14077 14078 14079 14080 18101,5 18105
RA1AMW.SPB.RUS.EU - Vasily - St Petersburg - (W) - no Packet
14068
SM6FMB.GBG.O.SWE.EU - Sven - (3581 3587 3589) 7037 7038 10141 1014
10146
14068 14072 14073 14074 14075 14076 18105 21073 21074 21076
21080 24915 28075 (V)

Africa

ZS5S.ZAF.AF - Joost - nr Durban - (X) zs5s@iafrica.com - (W)
7036 7037 14069 14073 14118 21069 21073
(B) AF/EU: 0500-0700 0800-1100 1500-1800
AS : 1100-1430 - SA: 1430-1500 - NA: 1800-2200
OC : 2200-0500 0700-0800
ZS6KM.TVL.ZAF.AF - Mario - Pretoria - 14075 (night) 21075.5 (day) - (B)(W)

List compiled by and with permission of Joost Schuitemaker ZS5S. See Joost's address immediately above.

Cruiser's Radio Guide Part Vb, Frequency Data

APPENDIX 21, HF Clover Mailboxes

(Amateur Radio Service, as of 1997)

List courtesy of Joost ZS5S.

Licensed amateur radio operators (US General Class and above) may send and receive messages using these Clover mailboxes. The mailboxes operate 24 hours/day, unless indicated, and forward directly to/from their local Packet Network or the internet (marked with "X" or "W"). See the Amateur Radio Chapter for a discussion of Clover. The frequencies listed are the LSB dial frequency. See the separate appendices for Amtor and Pactor mailboxes.

Legend:

Software used: (E) = Express, (R) = RLI, (O) = Other, (W) = Winlink
Other codes: (B) = Beam (headings), (H) = Web Homepage, (X) = Internet forwarding

Call/ Address Name Email Address Frequency(s) Notes

USA North America

AF5D.#SAT.TX.USA.NA - Joe - (W) 3630 3633 7065 7106.5 10135 10144.5
14110 14116
K4CJX.#MIDTN.TN.USA.NA - Steve - (x) steve.waterman@nashville.com -
(W) 3630 3633 7066 7068 7106.5 10144.5 14110 14116 21093.5
K5VMX.#SETX.TX.USA.NA - Bob nr Houston - (W) - K5VMX@juno.com
H24: 7065 7066 7106.5 - 0300-1200: 3630 3633 - 1200-0300: 14100
14110 14116 18105 21093.5
KC5LT.#SOCA.CA.USA.NA - Allan - 3630 7067 10135 - (W)
KQ4ET.#VABEACH.VA.USA.NA - Joel - Virginia Beach - (W)(NTS only)
3628 3630 7066 7067 7068 10134 10137 14110 14114 14116
N0IA.#SONEV.NV.USA.NA - Bud - Las Vegas - budt@worldnet.att.net - (W)
7067 7069 10134 10135 14116 0200-1300: 3630 7066 7068 1300-0200:
14067 14110 14116 18105 21067 21069
N1NNM.#ENC.NC.USA.NA - Luke - Millcreek - (V)(W) (X)
z3f3q3mh@abaco.coastalnet.com - 7066 7068 7106.5 0000-1200: 3630
3633 - 1200-2400: 10144.5
N5TC.#STEX.TX.USA.NA - Tom - 3628 7066 7067 7078 10135 10136 14078
18106 (W)

Cruiser's Radio Guide Part Vb, Frequency Data

Call/ Address	Name	Email Address	Frequency(s)	Notes
N6IYA.#CCA.CA.USA.NA	- John - H24:	7064 7065 7066 7067 7068 7069		
Day: 14064 14065 14066 14067 14068 14069 - (R)				
N8PGR.#NEOH.OH.USA.NA	- Hans -	3630 7066 - (W)		
NZ2T.#DFW.TX.USA.NA	- Bob - ? - (W)			
WORLOR.USA.NA	- Hank - hank_oredson@mentorg.com - (R)	on 2 radio's:		
7087 and (B) due E: 14100 14110 14111 14112 14112.5 14114 14114.5				
21092 21093.5 21094				
W2NRE.#ENY.NY.USA.NA	- Warren - (X)	76264.3107@compuserve.com		
(W) 3630 3633 3636 7066 7068 7106.5 10135 10136 10141 10144.5				
(X) 14100 14110 14116 18106 21066 -				
W4NPX.#CVA.VA.USA.NA	- Bob - (X)	w4npx@m6.sprynet.com - (W) (H)		
http://ourworld.compuserve.com/homepages/w4npx 3630 3633 7066 7068				
7106.5 10135 10136 10144.5 14066 14068 21066 28130.13 -				
W7IJ.#WWA.WA.USA.NA	- Bill - nr Olympia -	71736.1220@compuserve.com		
(W) 3630 7066 10135 14066				
W9MR.#SEIL.IL.USA.NA	- Ken - (X)	kenn@eriinc.com - (W)	3628 3630	
3633 7066 7068 7078 7106.5 10135 10136 10144.5 14110 14116				
WA1URA.IN.USA.NA	- Frank - (X)	fmoore@cris.com - (W)	3625 3630 3633	
7066 7068 7106.5 10136 10144.5 14066 14068 14110 14116 21066				
21068				
WA2MFY.NJ.USA.NA	- Pete -	3610 7065 7069 10135 10136 10141.5 (O)		
14065 14066 14067 14072 14078 18100 21065 21070 24925 28084				
WA7SJN.#WWA.WA.USA.NA	- Bill - Kalama, nr Portland OR -	7103.5 (R)		
WA9WCN.IN.USA.NA	- Bob - adams@iquest.net - (W)	3630 3633 3636		
7066 7068				
WB1DSW.NH.USA.NA	- Herb -	2200-1400: 7066 1400-2200: 14067 (R)		
beam WSW				
WB8NWQ.#CIN.OH.USA.NA	- Vince -	3630 7066 7067 7068 10135 14110		
14116				
WS7L.#EWA.WA.USA.NA	-	0100-0630: 7064 - (R)		
WX4J.#SWITZ.FL.USA.NA	- Earl -	3628 3630 7066 7068 14110 14116		

Outside USA

AP5ARS.#ISL.PAK.AS - Tariq/AP2TJ - (W)(X) ap2tj@paknet1.ptc.pk after
1300 (B) AF/EU: 14120.1 21066

CP5VW.BOL.SA - Mike - mburke@lajta.nrc.bolnet.bo 14100 14113.5 14114
14116 21065 21067 21068 21070 21101.5

FK8BK.NCL.OC - Louis - Noumea - 0700-1300: 14068 - (W)

GB7SIG.#45.GBR.EU - Jim - 14060 14110 14116 - (W)

ON6RO.#LG.BEL.EU - Rene - 7040.12 14066.12 14068.12 - (W)

Call/ Address	Name	Email Address	Frequency(s)	Notes
OZ2AMT.DNK.EU	- Kristian - (B)	1230-1600: USA (W)	1100-1300: 21066 -	
1100-1500: 14066 - 1200-1500: 14075.1				
VK2AGE.#NE.NSW.AUS.OC	- Gordon - nr Brisbane -	gadow@om.com.au -		
(W) 7047.1 10113.1 10129.1 14077.1 14079.1 21078 - beaming NA 2330				
0600 1030-1130 AF 0600-0800 AS/EU 0800-0900 (LP) 0900-1030 1130				
1300 1330-2330				
VK2DW.NSW.AUS.OC	- Don -	0600-2200: 14066 - (W)		
VK2EHQ.NSW.AUS.OC - soon!				
ZF1GC.#GC.CYM.CAR.NA	- Frank -	14066 21066 - fhgs@candw.ky		
ZS5S.ZAF.AF	- Joost - (W) (X)	zs5s@iafrica.com - 7043 14066 21066		
UPPER SIDEBAND (B) AF/EU: 0500-0700 0800-1100 1400-1730 AS :				
1100-1400 - OC : 2200-0500 0700-0800 NA : 1800-2200 - SA : 1730-1800				

List compiled by and with permission of Joost ZS5S. See Joost's addresses immediately above.



1710 - 21372
21302

24 hr spec prog - EPRC

930 1530 2

44

Transfer pump
one tank to another

Drubbin

2 Re-A Eric - middle
on low 1 1/2 mile off
San Quentin

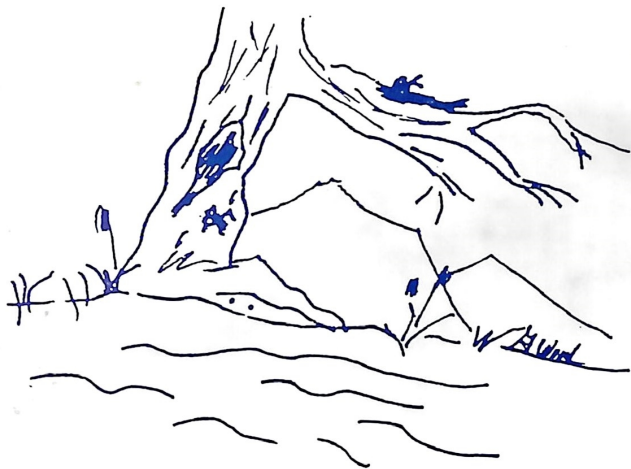
30° 21" north
115° 58" west

58' Transfer - 2 west
all white

Engine down - Fuel pump
Pump - needs to
Transfer pump

About The Author:

Roger and Marilyn lived aboard and cruised their ketch, Fantaseas for over 5 years. Roger is an Extra Class ham with 39 years experience in radio communications. He is a registered ARRL instructor and a W5Y1 Coordinating Volunteer Examiner. Roger previously gave yearly seminars on radio communications for cruisers in San Diego and has taught several ham radio license classes for cruisers. He has published the K0YY (ex W6SOT) Maritime Mobile Net List since 1985. Roger has also worked for a major amateur radio dealership.



REVISED 2nd EDITION

Cruiser's Radio Guide

This Major Revision of the **Cruiser's Radio Guide** updates:

Licensing
Regulations
Operating Procedures
Equipment
Installations
Trouble shooting
Operating Frequencies
Advanced Operations
--SITOR/ NAVTEX/ PACTOR/ WEFAX/ Packet
Weather Information Sources
Terms Used By Mariners and Hams

New in this revision:

Telecommunications Act of 1996 Changes Explained
New Marine Licensing Procedures Explained In Detail
Expanded Addresses, Phone #s, and Web Sites
Expanded Marine Voice Communications Procedures
New Marine Digital Communications Procedures
Updated Marine Broadcast Information
Expanded WX Frequency Information
Expanded Amateur Digital Operations
New Amateur Digital Communications Frequencies
Updated Amateur MM Net Frequencies
Five New Appendices Of Frequency Data
And more...

... And it does it in a user-friendly, understandable manner.